Quality Assurance Project Plan

Deep Soil Sampling Project: Marsh Creek, Minidoka and Twin Falls Nitrate Priority Areas

State of Idaho
Department of Environmental Quality

Ground Water Program

Version 1.0

March 17, 2017

Commented [EJ1]: AUTHOR: This date should be reasonably close to the final approval signature date

TRIM Record Number: 2017AIL31

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1 Title and Approval Page

Quality Assurance Project Plan

Title: Deep Soil Sampling Project: Marsh Creek, Minidoka and Twin Falls Nitrate Priority Areas

Region/Division: Ground Water Program

Version Number: 1.0

Date: March 17, 2017

Approval Signatures

Note: This QAPP becomes effective on the date of the last approval signature.

Program/Regional Manager

Signature: _____ _____
Name: Ed Hagan, Program Manager Date

Project Quality Assurance Officer

Signature: _____ _____
Name: Flint Hall, Environmental Scientist Date
*Note: At the time of QAPP signature, the project QAO is required to update the DEQ QAO project document tracker, found at TRIM Record #2012AEB8.

Project Manager - DEQ

Signature: _____ _____
Name: Amy Williams, Source Water Program Manager Date

Administrator, ISWCC

Signature: _____ _____
Name: Teri Murrison, Administrator Date

Project Manager - ISWCC

Signature: _____ _____
Name: Carolyn Firth, Idaho Soil and Water Conservation Commission Date

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2 Table of Contents

Commented [EJ2]: **AUTHOR**: The very last thing you should do to this document is to update all autogenerated lists and cross-references.
1) Make sure Track Changes is off.
2) Press **CTRL+A** (to select the whole document).
3) Press **F9** (to update all fields).
4) You will get a series of prompts for each of the table of contents elements in your document. For each prompt, select "**Update entire table**" and click **OK**.
5) After all the prompts, with the document still selected, hit **F9** again to repeat this process (running through it again correctly updates your cross-references).

[TOC \o "3-3" \h \z \t "Heading 1,1,Heading 2,2,Heading 1 non-numbered,1,Heading 2 non-numbered,2"]**List of Tables**

[TOC \h \z \c "Table"]**List of Figures**

[TOC \h \z \t "Figure caption" \c]List of Equations

[TOC \h \z \t "Equation caption" \c]**Appendices**

[TOC \n \h \z \t "Appendix title,1"]

3 Distribution List

At a minimum, the following personnel and analytical laboratory contacts will receive either an electronic or hard copy of the final signed quality assurance project plan (QAPP) ([REF _Ref336509508 \h]).

Table [SEQ Table * ARABIC]. Project QAPP distribution list.

Name	Project Affiliation	Organization and Address/Location	Contact Number, e-mail
Don W Zaroban, PhD	DEQ Quality Manager	DEQ—Director's Office	(208) 373-0405 Don.Zaroban@deq.idaho.gov
Ed Hagan, PG	Program/Regional Manager	DEQ—State Office Ground Water Program Manager	(208) 373-0356 Ed.Hagan@deq.idaho.gov
Flint Hall, PG	Project Quality Assurance Officer	DEQ—Idaho Falls Regional Office	(208) 528-2650 Flint.Hall@deq.idaho.gov
Amy Williams, DEQ, Carolyn Firth, ISWCC	Project Manager, DEQ Project Manager, ISWCC	DEQ—State Office, Source Water Protection Program ISWCC,	(208) 373-0115 Amy.Williams@deq.idaho.gov (208) 678-1225 X110, Carolyn.Firth@swc.idaho.gov
Teri Murrison	Administrator, ISWCC	322 E Front Street, Suite 560 Boise, ID 83702	(208) 332-1790 Teri.Murrison@swc.idaho.gov
Ralph Fisher, EPA	Nutrient Management Specialist, EPA, Technical support	EPA 950 W. Bannock St. Suite 900 Boise, Idaho 83702	(208) 378-5761 fisher.ralph@epa.gov
April Leytem, NRCS	Research Soil Scientist, Technical Support	USDA Agricultural Research Service 3793 N 3600 E Kimberly, ID 83341	(208) 423-6530 april.leytem@ars.usda.gov
Michael Clancy	Sampling Contractor	Ecopoint, Inc. 223 Center Street, Kimberly, ID 83341	(208) 596-8194
Cathy Bingham, Western Laboratories, Inc	Analytical Laboratory	Western Laboratories, Inc 211 Hwy 95, Parma, ID 83660	(208) 649-4360

Commented [EJ3]: AUTHOR: Please add/delete additional rows as necessary. However, note that the table MUST include the DEQ Quality Manager, Program/Regional Manager, QAO, project manager, and the laboratory contact if a lab is used. Filling in the names here will automatically replicate these name in the next table and org chart.

4 Project/Task Organization

Key project personnel and their responsibilities are defined in [REF _Ref336259372 \h]. An organizational chart is provided in [REF _Ref336439141 \h].

The project staff duties and responsibilities described in [REF _Ref336259372 \h] are not intended to be all inclusive; see sections 1.2.5 through 1.2.7 of the DEQ *Quality Management Plan* (QMP) (DEQ 2012a) for a more detailed description.

Table [SEQ Table * ARABIC]. Key project personnel and associated responsibilities.

Name	Project Title/Responsibility
Ed Hagan, PG	**Program/Regional Manager**: Note: The following description is *not all inclusive*; see section 1.2.7 of the DEQ QMP for a more detailed description. This person is the regional manager or State Office program manager for the project. Duties and responsibilities include: • Assists in the review of the QAPP and signs the final QAPP as an approver. • Confirms the project QAPP meets the needs of the program/region. • Ensures the QAPP is approved prior to the start of project work. • Ensures the program/regional procedures and policies referenced in the QAPP are current and approved for use. • Performs all duties and responsibilities as assigned in the project QAPP. • Selects and assigns a project quality assurance officer (QAO), who meets the criteria for independence defined in the DEQ QMP (see QAO duties below), and obtains approval for this selection from the DEQ quality manager.
Flint Hall, PG	**Project Quality Assurance Officer**: Note: The following description is *not all inclusive*; see section 1.2.5 of the DEQ QMP and the project QAPP for a more detailed description. Duties and responsibilities include: • Assists in the review of the QAPP, verifies the QAPP meets the requirements of the DEQ QMP, and signs the QAPP as an approver. • *All assigned QAOs are required to contact the DEQ quality manager to discuss the project prior to signing any project QAPP for approval. When the project QAO signs the QAPP for approval, the QAO is required to update the DEQ QAO project document tracker found at TRIM record #2012AEB8.* • Performs an annual audit, using the QAO audit checklist located in [REF _Ref342552156 \r \h], on all assigned projects to evaluate project compliance with the approved project QAPP. Files the completed audit checklist in TRIM to document the audit. • Provides data validation per the project QAPP, using the appropriate checklist located in [REF _Ref342552156 \r \h], and may also participate in final project report review. • Documents all audit and data validation activities in the DEQ TRIM system, per the DEQ QMP and the approved QAPP. • In matters of project quality, this individual has a direct line of communication to the DEQ quality manager. • Must meet the following independence criteria: The QAO shall not be the project manager, program manager, or be otherwise assigned to the project data generation efforts. Neither the project manager nor the QAO may directly report to the other within the DEQ organizational structure, and both of these individuals may not be directly supervised by the same person. • Performs all other duties and responsibilities as assigned in the project QAPP. The duties and responsibilities of the project QAO also apply to any field sampling plan (FSP) generated under the project QAPP, unless an FSP-specific QAO is assigned and approved.
Amy Williams, DEQ, Carolyn Firth, ISWCC	**Project Manager - DEQ**: Note: The following description is *not all inclusive*; see section 1.2.6 of the DEQ QMP and the project QAPP for a more detailed description. Duties and responsibilities include: • General role is to complete responsibilities related to adherence to DEQ QMP and contracting requirements. • Oversees subgrant agreement with Idaho Soil and Water Conservation Commission, ensuring adherence to contract requirements. Completes required

	subgrant regular reporting requirements. • Signs the final QAPP as an approver. Enters the approved and current project QAPP in the TRIM system, including a copy of the signed approval page. • Ensures all project work is conducted in accordance with the DEQ QMP, the approved QAPP, and the applicable project operating procedures. • Performs data review and verification per the project QAPP, using the appropriate checklists located in Appendix A • Reviews the project QAPP/FSP and standard operating procedures (SOPs) annually to determine if revision is necessary. If the project QAPP, FSP, or associated SOPs do require revision, the project manager initiates such action. All such documents will be revised, reviewed, and approved in accordance with the DEQ QMP. • Documents all audit and data review/verification activities in the DEQ TRIM system, per the DEQ QMP and approved QAPP. • Ensures all appropriate project and tracking documentation are maintained in TRIM. **Project Manager - ISWCC:** Note: The following description is not all inclusive. Duties and responsibilities include: • General role is to complete responsibilities related to adherence to DEQ subcontract agreement and completion of field work in accordance to the approved QAPP/FSP. • Performs overall project planning, document development and approval, sample planning and coordination, laboratory coordination, reporting functions, and project report/summary development. • Generate and implement a contract with a selected contractor to collect and analyze soil samples. • Ensures that ISWCC/subcontractor Personnel assigned to this project are appropriately trained and qualified, • Work with the contractor and the producers to identify specific fields and sampling sites for each participating producer. • Develop and implement a data base management procedure to store and protect data confidentiality for participating producers. • Generate published soil survey maps and interpretations for each selected field. Provide that information to the contractor. • Provide guidance and oversight to the contractor to insure implementation of all phases of the sampling, analysis, and data management procedure as required. • Review the laboratory analysis of soil samples with each producer when received from the contractor and as necessary determine additional nutrient and/or irrigation planning and implementation strategies. • With the assistance of the Soil and Water Conservation Districts and the Ground Water Quality Improvement Committees, develop and implement a public information program to ensure public and producer awareness and understanding of the project, as needed.
Michael Clancy, Ecopoint, Inc.	**Project Staff/sampling subcontractor**: This is the primary contact the subcontractor for soil sample collection and for interface with the • Contacts and coordinates with producers to facilitate sample collection • Collects and collates Deep Soil Sampling Program questionnaire • Reports soil analysis results to producers and summarizes results for ISWCC/DEQ
Cathy Bingham,	**Laboratory Contact/Manager**: This person is the primary contact at the laboratory for DEQ/ISWCC project staff

Western Laboratories, Inc	• The laboratory contact/manager issues sample receipts, and verifies analysis, and confirms the laboratory data review.

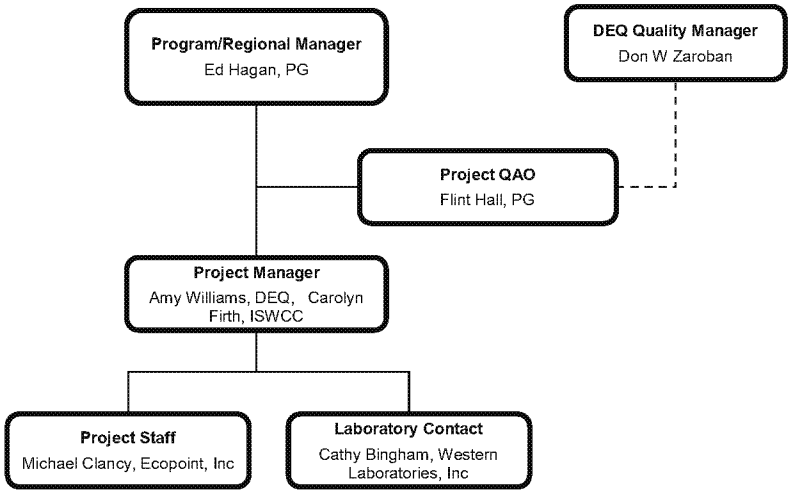

Figure [SEQ Figure * ARABIC]. Project organizational chart.

5 Problem Definition/Background

Nitrate is one of the most widespread ground water contaminants in Idaho and the most common contaminant found in public water supply systems. High levels of nitrate in drinking water are associated with adverse health effects.

The Idaho Department of Environmental Quality (DEQ) has established a goal of restoring degraded ground water and protecting public drinking water sources. To facilitate achieving this goal, DEQ has developed a list of degraded ground water areas within the state of Idaho. This list focuses on nitrate and ranks the top 34 nitrate-degraded areas (referred as nitrate priority areas or NPAs) in the state based on the severity of the degradation; the rank of "1" indicates the most severely impacted area.

The Marsh Creek area, located in Cassia County, is the #1 ranked NPA on the most current list of degraded areas (2014). Minidoka NPA is ranked #25, and Twin Falls NPA is ranked #21.

5.1 Problem Statement

To affect improvement in ground water, DEQ partners with others, including the Idaho Soil and Water Conservation Commission (ISWCC) to evaluate effectiveness of efforts to reduce impacts to degraded ground water and to restore water quality.

The Idaho Soil and Water Conservation Commission (ISWCC) proposes to conduct post-harvest deep soil sampling (PHDSS) on fields located within the Marsh Creek, Minidoka, and Twin Falls NPAs to help interested land users see the relationship between management practices applied on a specific field and ground water quality impacts.

The ISWCC Post Harvest Deep Soil Sampling Project (PHDSS) will assist in demonstrating the relationship of applied nutrients and irrigation water in a field to ground water quality. This study does not directly monitor the application rates or efficiency of applied irrigation water; instead it focuses on the final results of applied nutrient and irrigation water of soil test nitrogen concentrations. Demonstration of the qualitative results of nutrient management practices will provide the basis for educating agricultural producers to the effectiveness of their nutrient and irrigation water management in maintaining nutrients within the crop rooting depth.

Application of nutrients in excess of crop needs in concert with over application of irrigation water results in excessive concentration of nitrogen below the root zone. Nitrogen found below the root zone at the end of the growing season is symptomatic of imperfect nutrient and irrigation water management techniques applied to the field through the growing season and from previous applications. Measuring deep soil nitrate may help identify activities that contribute to nitrate ground water contamination and provide relatively quick feedback on the effectiveness of changes to management practices designed to reduce ground water contamination.

Initial deep soil sampling will be conducted for the purposes of:

- Establishing baseline data: Provide field specific baseline data regarding the nitrogen content (nitrate, and ammonium) of soils underlying a variety of soil, crop, nutrient sources, and irrigation systems within the project area.
- Educating producers: Provide the foundation for a technically based education program. The intent of the project is to provide field specific information to producers that they will use to evaluate their current nutrient and irrigation water management practices and if necessary modify those practices leading to reduced soil test concentrations and ultimately, improved ground water quality.
- Serving as a pilot project: Provide information about project design, practical realities, time requirements and costs that can be used in developing subsequent project scopes.

5.2 Intended Usage of Data

The intent of this project is to provide an improved understanding of the correlation between residual nutrients, current production methods, and areal extent of regions of nitrate degraded ground water. Information will be collected in a manner that will aid those that participate in

improving their farming practices and well as ensures confidentiality as required by law. Sample results and recommendations will be reported back to the participants.

Information gained will be used to increase public awareness of the project through various means and will be used to guide education and communication efforts. Summary reports will be provided to DEQ.

6 Project/Task Description

6.1 General Overview of Project

Deep soil sampling will be conducted initially for one growing season to collect baseline information. Deep soil sampling may be repeated in future years, as funding allows, allowing analysis of the effects of changing management practices.

The deep soil sampling project will be implemented by the Idaho Soil and Water Commission and is summarized as follows:

1. Grower participation will be solicited by general mailings and outreach by the ISWCC, local conservation districts, the Cassia County/Minidoka County Ground Water Quality Improvement Committee and the Twin Falls County Ground Water Quality Management Advisory Committee members.
2. Producer confidentiality: The ISWCC will develop a process for data collection and analysis designed to separate the identity of participating producers and the specific locations of the sample sites from data and analysis generated. Part of this process is the use of a unique identification number (UIN) system. The UIN will be given only to the participant. Soil samples and results from the analysis will be identified only by the UIN.
3. Completion of a Deep Soil Sampling Program Questionnaire by the grower that includes information specific to an individual field such as pertinent management information including cropping systems, nitrogen sources and amounts, historical yields, irrigation practices and application methods (Appendix A). Unless the producer includes identifying information on the questionnaire, the questionnaire will only be identified with the UIN.
4. Soil sampling and analysis will begin in pre-fertilization, spring, 2017. Soil samples will be:
    - Taken prior to fertilization prior to planting in the spring, and after crop harvest but prior to nitrogen applications where possible.
    - It's desirable to sample the same fields pre-fertilization and post-harvest, dependent on availability and permissions.

- Collected at 1-foot increments from 0 feet to a depth not exceeding 6 feet, or to the depth of refusal, such as basalt, gravel or caliche that defines the limits of a shallower potential root zone.
- The 0-1 foot soil sample will be analyzed for pH, salts, chlorides, sodium, CEC, excess lime, organic matter, organic nitrogen, macronutrients (nitrate, phosphorus, potassium, calcium, magnesium, and sulfate) and micronutrients (zinc, iron, manganese, copper, and boron).
- Soil samples taken below 1 foot will be analyzed for nitrate, ammonium, and phosphorus only.
- Soil descriptions will be recorded in the field, and the NRCS Soil Series will be identified and documented.

5. Sampling and analysis will be performed by qualified firms which will be contracted to ISWCC.
6. ISWCC will analyze results from soil sampling to identify the risk of nitrate leaching posed by the various soil/cropping/irrigation systems.
7. Generalized technical data and results will be provided to DEQ, but grower specific information will not be provided to DEQ. Locational information will be ~~kept confidential by~~ separated from resulting by utilizing a Unique Identification Number (UIN) supplied to the grower.

6.2 Project Timetable

The overall project timeline is presented in Table 3. This time includes project planning and preparation, execution of the soil sampling campaign, with sampling, and related data gathering, analysis and reporting. Constraints on this schedule includes time required for initial documentation preparation, weather conditions impacting spring field preparation and planting, as well as factors governing the harvest and scheduling with the sampling contractor and analytical lab. The timetable is also constrained by the contractual obligations for the DEQ funding source. The intent of this project is to document a single growing season with the potential for follow-up to future growing seasons.

Table [SEQ Table * ARABIC]. Project timetable.

Project Team	Initials	Activity
Ed Hagan	EH	Program Manager
Amy Williams	AW	Project Manager, DEQ
Carolyn Firth	CF	Project Manager, ISWCC
Flint Hall	FH	Project QAO
Soil sampling Subcontractor	SC	Coordination/contact with producers, Soil sampling
Estimated Dates		**Tasks**
Mar 2017	All	Plan approval
Mar - Apr 2017	CF	Complete scope of work for sampling contractor
Apr 2017	CF	Work with contractor, local SWCC to identify producers and fields for inclusion in study, recruit participants
Apr – May 2017	SC,CF	Collect samples, submit to lab, CF- provide oversight
May 2017	FH	Field observation, audit
May – Aug 2017	CF	Receive questionnaires, Review soil analysis results
Aug – Nov 2017	SC,CF	Post-harvest sample collection, submit to lab, CF- provide oversight
Oct – Nov 2017	CF	Review soil analysis results, communicate to producers
Nov – Dec 2017	CF	Produce final report for DEQ
Dec 2017	AW, EH	Review and approve final report
Dec 2017	FH	Complete QA reporting and review

7 Quality Objectives and Criteria

This section of the project QAPP defines the project data quality objectives (DQOs), essentially defining the requirements to support the qualitative or quantitative design of the data collection effort. DQOs are also used to assess the adequacy of the data (new or existing) in relation to their intended use. Data quality indicators (DQIs) are used to describe, in part, the specific measurement elements to be used when evaluating data in support of the project DQOs. Project staff can find additional information and guidance concerning the DQO process and DQI selection and definition in the following reference materials:

- EPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA 2006c)
- EPA *Guidance for Quality Assurance Project Plans* (EPA 2002a)
- EPA *Requirements for Quality Assurance Project Plans* (EPA 2001).
- EPA *Guidance on Environmental Data Verification and Data Validation* (EPA 2002b)

The objective of quality assurance and quality control (QA/QC) is to ensure that analytical results obtained by soil sample analyses are representative of actual chemical and physical composition of the soil. Field QA/QC will consist of following a standard protocol for sample collection and collecting and analyzing sample duplicates or replicates and performance evaluation (PE) samples or "known samples". The duplicates are used to determine both field and laboratory precision. The PE samples will be derived from stock originating from the North American Laboratory Proficiency Testing Program, and will consist of samples of local soil matrix fortified at a known concentration. April Leytem, ARS USDA, Kimberly, ID will prepared PE samples with native soil materials provided. Both the duplicate and PE samples are stored and handled in the same manner as the normal samples. Project goals and sampling conditions do not require additional field QC samples. All QC samples will be submitted "blind" (i.e., not identified as a QC sample). Ideally, at least one set of field QC samples will accompany each sample shipment.

Field QC samples for this project will comprise at least 10% of all samples.

Level I: This refers to field screening or analyses using portable instruments, and results are commonly not compound-specific or quantitative. Generally, Level I data are related to activities such as locating sample collection points for laboratory analysis and are associated with instruments such as photoionization detectors (PIDs).

- **Generally associated verification/validation stage:** Level I may be associated, depending on data user requirements, with "Stage 1" verification and validation checks as described in Appendix B, Section 1.1, of EPA's *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA 2009).

Level III: This level refers to standard EPA-approved methods that may be equivalent to Level IV methods (see below), with the exception that the level of documentation supplied with analytical results is frequently less robust.

- **Generally associated verification/validation stage:** Level III may be associated, depending on data user requirements, with "Stage 2A" or "Stage 2B" verification and validation checks as described in Appendix B, Sections 1.2 and 1.3, respectively, of

EPA's *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA 2009).

Data collected in support of this project will consist of Field screening data (e.g., field measurements, assessment of soil properties – color, texture, moisture content, including results from participant questionnaire) and are considered data quality Level I (field parameter/screening level data).

Laboratory analytical data (i.e., data from samples submitted to a laboratory for analysis) are at data quality Level III (standard laboratory procedures and data reviewed by standard QA protocols).

7.1 Data Accuracy, Precision, and Measurement Range

Accuracy is a measure of the agreement between a "true" or reference value and the associated measured value. This sampling campaign will include spiked Performance Evaluation (PE) samples with a known matrix submitted blind to the laboratory. Recoveries of Laboratory Control Samples (LCS), and laboratory matrix spikes, and surrogate spikes may also be reviewed to evaluate the accuracy of the measurements. These recoveries are typically calculated as "percent recovery" (%R) represented by [REF _Ref336502492 \h] and [REF _Ref336502498 \h].

$$\%R = C_M / C_T \times 100$$

Equation [SEQ Equation * ARABIC]. Spiked sample or LCS percent recovery.

Where: C_M = measured spike/LCS concentration
C_T = true spike/LCS concentration

$$\%R = (C_S - C_{US}) / C_T \times 100$$

Equation [SEQ Equation * ARABIC]. Matrix spike and surrogate recoveries.

Where: C_S = measured concentration of spiked sample
C_{US} = measured concentration of unspiked sample
C_T = true concentration of spike added

Laboratory accuracy for each analysis is determined through statistical analysis of the laboratory equipment by the laboratory; the acceptable accuracy range for the laboratory equipment will be indicated in the laboratory sheets. Any outliers from the acceptable range in percent recovery, as determined by the laboratory, will be flagged by the laboratory. Accuracy requirements for this project are ± 20%. Nitrate concentrations for this sampling event are planned to be fortified to > 50 mg/kg of soil.

Precision is a measure of agreement between two measurements of the same property under prescribed conditions. Sampling campaigns may include duplicate samples (field replicates or split samples—see section 14) or may rely on LCS split sample results. The relative percent difference (RPD) of duplicate samples will be used to assess data precision. For laboratory

duplicates, field duplicates, and matrix spike duplicates, [REF _Ref336502516 \h] will be used to calculate

RPD:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Equation [SEQ Equation * ARABIC]. Relative percent difference (RPD).

Where: C_1 = concentration in first sample
C_2 = concentration in the second/duplicate sample
Where both C_1 and C_2 > 5 times the laboratory method detection limit (MDL)
Where one or both C_1 and C_2 are ≤ 5 times the MDL, the results will be considered within control limits where C_1 and C_2 are ± MDL.

Precision will be based on field, LCS, and, if used, matrix spike duplicates, with an RPD goal of ±20%.

Appropriate **measurement range** is determined by reviewing results with comparison to the laboratory reporting levels or MDLs. Reporting requirements are determined prior to sampling through review of historical data for the analytes and region of interest and reflected in choice of analytical laboratories, analysis methods, and requested reporting levels or MDLs.

7.2 Data Representativeness

Representativeness is the degree to which the sample data accurately and precisely represent site conditions. The representativeness criterion is best satisfied by confirming that sampling locations are properly selected, sample collection procedures are appropriate and consistently followed, a sufficient number of samples are collected, and analytical results meet data quality objectives. All sampling procedures will follow the sampling procedure in [REF _Ref342552241 \r \h * MERGEFORMAT]. Representativeness is evaluated during data review, verification, validation, and reconciliation efforts by comparing the combination of data accuracy, precision, measurement range, and methods and assessing other potential sources of bias, including sample holding times, reported results of blank samples, and laboratory QA review.

7.3 Data Comparability

Comparability is the confidence with which one data set can be compared to another data set. Using standard sampling and analytical procedures will maximize comparability. To ensure data comparability, sample collection procedures (included in [REF _Ref342552241 \r \h]) will be consistently followed, the same analytical procedures will be used, and the same laboratory will be used to analyze the samples for pre-fertilization and post-harvest throughout each project. And collection, handling , and analysis methods constant with similar projects such as the Yakima Lower Yakima Valley deep soil sampling project, and Shoshone-Bannock deep soil sampling project.

7.4 Data Completeness

Completeness is the percentage of valid data relative to the total possible data points. For data to be considered valid, it must meet all of the acceptance criteria, including accuracy and precision, and any other criteria specified by the analytical method used. The overall data quality objective for completeness for the sampling events conducted under this QAPP is 80%, based on the number of producers and fields contacted for sampling verses the number of fields with valid sample results. If the sampling event does not meet the quality assurance goal of 80%, the data will be discussed with the program manager and a course of action agreed upon. Any required departure from this goal will be justified and explained in the project records in accordance with the QMP.

8 Special Training/Certification

All specialized or non-routine training, qualifications, or certifications necessary for project and/or laboratory staff is listed below.

The project manager is responsible for ensuring that personnel assigned to this project are appropriately trained and qualified, with the appropriate training records on file with DEQ human resources.

All work performed by DEQ personnel will be conducted in accordance with the *Idaho General Safety and Health Standards* (Division of Building Safety 2006).

Field sample collection will be accomplished by a subcontract. That subcontractor will have all applicable certifications and will conduct their work according to standard operational and safety practices.

- No specialized or non-routine training for soil sample collection associated with this project is required; DEQ and ISWCC staff will be familiar with applicable methods and SOPs as referenced in this QAPP.

9 Documentation and Records

Project Quality Assurance documents and final reports will be filed electronically in TRIM in accordance with applicable program filing procedures. The project manager is responsible for ensuring that a copy of the current approved (and signed) project QAPP, with related FSPs and standard operating procedures (SOPs), is available in the DEQ TRIM electronic records management system. A copy of the signed signature page for the project QAPP and FSP (if used) is to be filed in the TRIM system by the project manager. Preferably, the approved document, including the signed signature page, is attached to the TRIM record in PDF format. Field data collection, soil sample results and producer questionnaires will be maintained by ISWCC and will not be included in DEQ record keeping.

Field personnel shall use the field data collection forms included in Appendix C to document each day's activities. An additional field log book may be utilized to record pertinent information not captured in the provided data collection forms. Information is to be recorded as follows:

- Project data must be recorded directly, promptly, and legibly.
- Field logbook or field sheet entries must be made in black or blue permanent ink and must be signed/initialed and dated by the person making the entry.
- Changes or corrections to field logbook notes and/or data must be indicated with a single line through the original entry. Changes must be initialed, dated, and explained. A field sheet may be discarded and information reentered on a new data sheet if needed.

All documentation necessary to support the objectives of the project and the validity of project data— field records including grower questionnaire, chain-of-custody forms, laboratory reports, field notes, field logbooks, etc., and QAPP, FSP, audit reports—shall be retained. The QAPP, any FSP developed, Annual project audit and assessment documentation, per the DEQ QMP, shall also be entered into the DEQ TRIM document system by the project QAO and/or the project manager, as applicable in accordance with the current approved DEQ records retention schedule (TRIM record #2010AIC3). Field records will be maintained by ISWCC in an appropriate manner that maintains data integrity and meets security and retention requirements.~~set forth~~ ~~See in~~ theIdaho Soil and Water Conservation Commission Records and Retention Manual (~~Appendix E~~).

Commented [A4]: I believe that the citation to the manual is probably sufficient and the appendix can be removed (SCK).

Commented [FH5]: Include ISWCC record retention manual as appendix

10 Sampling Process Design

The intent of sampling is to provide for agricultural producers a correlation between nutrient management practices for specific fields and potential ground water quality impacts. The design presented for this sampling provides a template that may be applicable in other regions for addressing the question of residual soil nitrates following a growing season.

Sample design includes rational for site selection and a structure for sample project design and management. Rational for sample site selection, identification, handling, analysis and reporting is presented in the following sections.

10.1 Rationale for Selection of Sampling Sites

Grower participation is voluntary and will be solicited by general mailings and outreach by the ISWCC, local conservation districts, and the Cassia/Minidoka Ground Water Quality Improvement committee and the Twin Falls Ground Water Quality Improvement committee. Growers will be encouraged to participate and to propose fields for sampling.

Selected fields will be chosen to provide a representation of crop and field conditions within the nitrate priority area and field-specific data including application of animal waste and/or commercial fertilizer. The total number of sites is constrained by the available budget, grower response, and timing and availability for sample collection.

Locations for sampling will be constrained by proximity to Nitrate Priority Areas and modeled model ground water source delineations produced by DEQ. Fields selected for soil sampling will be located within or near (1/4 mile) of an identified ground water source delineation as determined for Source Water Assessments (SWA) and within or near (1/4 mile) of the Marsh Creek, Minidoka, or Twin Falls NPAs. A goal of 60 fields for soil sampling is set for the 2017

growing season. These should be distributed approximately equally for the Marsh Creek NPA in Cassia County, the Minidoka NPA in Minidoka County, and Twin Falls NPOA in Twin Falls County – 20 sites per NPA/County. Maps of the referenced NPAs, counties with corresponding SWA ground water delineations are presented in Appendix A. In addition to the planned number of sample sites per NPA, 2 duplicate locations and one PE (Performance Evaluation, also known as "spiked" or fortified) sample will be collected for each of the NPA/Counties – a total of 3 quality control (QC) samples per NPA/County, and 9 QC samples overall.

10.2 Sample Design Logistics

Sampling logistics for this specific project are presented in this QAPP. Sampling logistics for possible future sampling may be detailed in monitoring campaign specific Field Sample Plans that may be developed.

Specific producer/growers will be contacted by ISWCC based on input from the identified partners in Section 6.1, Item 1, and meeting the location criteria presented in Section 10.1. Those producers/growers agreeing to participate will be contacted and scheduled for sampling and provided with the Deep Soil Sampling Program Questionnaire (Appendix A) to complete and return by mail to the ISWCC.

Site identification record keeping will be designed to keep preserve to the degree possible confidentiality of the producer. The sampling contractor will provide each participant with a Unique Identification Number (UIN), generated at the time of sample collection following the pattern:

CC – SS

Where:

CC – Idaho county FIPS code: Cassia Co – 31, Minidoka Co – 67, Twin Falls Co - 83

SS – Serial site number; ex. 01, 02, 03 . . .

The UIN serial number will increment by 1 for each field. A grower/producer that has two fields will have consecutive UNI numbers: ex 31-01, 31-02 – if in the same county, or the next available serial number if fields in different counties are sampled. UIN numbers will be recorded on the Deep soil sampling questionnaire, Sampling Field Form and Soil Bore Log. A complete table of Idaho FIPS codes (Table B1) is included in Appendix B.

A sample site Identified as a "duplicate" site will be assigned serial site numbers SS = 31 or 32. Samples submitted as PE sites will be assigned SS=33.

Sample identification for record keeping and custody control will use an indexing system based on the UIN described and a serial sample number per field based on sample depth interval. The following pattern for field sample number will be used:

UIN – DD

Where:

UIN - (**CC – SS** for the sample site)

DD – Representative depth interval:

0-1 ft – 01, 1-2 ft – 02, 2-3 ft – 03, 3-4 ft – 04, 4-5 ft – 05, 5-6 ft – 06

The sample number will be recorded on the Sample Field Log and Sample Chain of Custody (COC) record, and on the individual sample container for that specific sample.

10.3 Sampling Schedule

The sampler and the producer will coordinate the sampling schedule for each field based upon the anticipated harvest date for the crop in that field the year of sampling. Samples will be taken as soon after harvest of the respective crop as possible (late summer and fall) and will be completed prior to: 1) Fall application of nutrients. 2) Irrigation to establish fall seeded crops. 3) Fall precipitation, as possible. Each sampling site will be sampled for baseline purposes once each year for the duration of the project, unless additional soil sampling is requested based on review of data by the producer or the ISWCC. Recent crop, nutrient, and irrigation actions will be recorded by Sampler.

11 Sampling Methods

11.1 Rationale for Selecting Soil Sampling Sites

The intent of soil sampling for this project is to assess generic field conditions for the purpose of surveying the effects of management practices employed by individual growers/producers. The ISWCC understands that it would be cost prohibitive to characterize each field to a level of detail necessary to identify all the variability within a field or to accurately quantify field-level leaching estimates. Sampling sites will therefore be selected to measure effects of management practices for the field conditions.

Sample sites within a selected field will be selected recognizing the following two expected sources of sample variability within that field:

Generic Variability: Generic conditions exist which create variability in all fields. Examples include field border effects, cultivation patterns, and position relative to an irrigation system. A

minimum of 100 feet shall be established as a setback from field edges, field entry points, water features such as ditches, ponds, waterways or drainage ditches, etc.

Field Specific Variability: Factors that cause field specific variability include soil type, topography, and management practices. Selecting a sample site with relatively uniform conditions will be the responsibility of the contract sampler and the grower. While resources are available to aid the grower, most growers have intimate knowledge of their fields and are best suited to select the locations of average field conditions. The contract sampler insures that sampling sites will be representative of the field or management unit being sampled.

Specific soil sample locations will be determined with input from the grower, the sampler and the ISWCC representative. Detailed soil survey maps and interpretations will be generated by the ISWCC using a USDA published or online soil survey for each field as further guidance for specific site selection. The sampling zone will be located on the soil survey map within the predominant soil type(s) of the field deemed to be representative of the management program and physical attributes of the field.

11.2 Definition of Terms Pertinent to Soil Sample Collection

Standard soil sampling methods rely on specific terms to guide sample collection. The soil sampling contractor will adhere to the following definitions for these pertinent terms:

Borehole: A borehole represents the point at which soil samples are obtained, one for each selected site. Six discrete soil samples are collected from each borehole, discrete samples being taken at the designated depths. Samples from the same depth for each of the 5 boreholes are mixed together to form a composite sample. Boreholes may be advanced by any method capable of collecting discrete samples over 1-ft intervals at the prescribed depths. Mechanized (e.g. pneumatic, hydraulic) sampling devices are required.

Commented [TM6]: Moved to alphabetize the definitions

Composited One-foot Sample: Soil samples that represent each one foot sampling depth, mixed together to form one consolidated sample. A sample of the consolidated sample will be selected and provided to the laboratory for analysis.

Conservation Planning or Field Location Maps: Aerial photographs used for conservation planning purposes which are generally included in the producers' field specific conservation plan will be used to identify the location of selected fields in relation to the rest of the operating unit.

Discrete Sample: A one foot soil sample for each of the sampling depths retrieved from a borehole, prior to compositing.

Published Soil Survey Descriptions: Data and descriptions which identify and describe soil mapping units included on published soil survey maps.

Published Soil Survey Maps: Maps generally included in the producers conservation plan which delineate soil texture boundaries within a field. Maps are generated using USDA NRCS published soil survey data.

Sampling Setbacks: Those areas of the field that are automatically determined to be not representative of the average field condition and therefore inappropriate for sampling. Examples include field borders, first span of a center pivot, field entry points, and harvest haul roads.

Sampling Site: Five sampling sites will be selected within the Sampling Zone. The Sites will be located within the soil type of the field and deemed to be representative of the physical attributes of the field including soil texture, irrigation type, slope, water table, etc.

Sampling Zone: The field area available for sampling after the setbacks described above are taken into account.

11.3 Soil Sample Collection Methods

The soil sampling contractor will follow industry standard, direct-push, continuous sample collection methods utilizing a mechanized sampling tool (e.g. Giddings, AMS, GeoProbe) that can collect soil from discrete one-foot increments without cross contamination. Samples will be collected and information recorded following industry standard methods.

For each sample site, five continuous bore samples each representing 6 discrete, one-foot samples per bore will be collected, with a minimum of four boreholes within each sample site if limited by conditions. The minimum nominal diameter of the standard cores shall be 2-inches; however, if refusal below a depth, as small as a 1-inch diameter core may be used. If refusal occurs prior to 6 feet, the sampler will record sampling depths that were reached and samples collected for that site on the Sampling Field Form (Appendix A).

The discrete one foot samples from each borehole will be placed in clean plastic buckets (one for each depth interval) then mixed to consolidate the soil into one representative, composite one-foot sample to be analyzed. After compositing, a portion of soil in each quadrant of the bucket will be transferred to a lab-prepared sample bag. The sample bag will be clearly marked with the date and time of collection, the sampler's initials, and the sample identification number. During boring, the sampler will compare the soil texture to the published soil survey data and insure that the sample is consistent with published data. Soil descriptions will be included on the accompanying Soil Boring Log (Appendix A)

If boreholes terminate at different depths, composite samples will be created by compositing available discrete samples (which may number less than four). During boring and soil collection, care should be taken to avoid mixing the soil from discrete one-foot depth increments with soils from shallower or deeper depths.

Following satisfactory collection of samples, boreholes will be backfilled by the sampler using tamped native soil to prevent creation of a vertical conduit.

11.4 Soil Sample Data Collection and Record Keeping

Project field information will be captured on the appropriate field forms (Appendix A). The soil sampling contractor will be provided with the Deep Soil Sampling Program Questionnaire, Sampling Field Form Soil Boring Log, and Chain of Custody (COC) record forms. The soil sampling contractor will also maintain a correlation between the producer/grower contact information with specific field and the UIN, communicating that with ISWCC. This will allow results and recommendations to be communicated with the program participant. Original copies of the sampling program questionnaire, soil boring log and COC record forms will be maintained by ISWCC.

Commented [A7]: For confidentiality reasons it would be preferable to not have the sampler keep any record that correlates between the name of the grower and the location of the field with the UIN. (SCK)

Variations on this or other aspects of the sample collection process can be updated in a FSP for future sampling campaigns.

QA/QC procedures as specified for sample collection will be followed by sampling personnel. The QA/QC procedures will be fulfilled by adhering to all requirements detailed in this QAPP. Such adherence will be demonstrated through appropriate documentation of sampling procedures within the field logbook or field sheets as described herein. Field audits by the project QAO may also be part of QA/QC procedures.

11.5 Safety and Liability

Because of the proposed sample depths, samplers should use mechanized sampling equipment, which is inherently dangerous. In addition to physical hazards of the equipment itself, there is the potential to intersect power and other utility lines that may lie above or beneath a sampling site. The sampler must call the utility notification center (information at [HYPERLINK "http://www.callbeforeyoudig.org"]) and leave sufficient time for their response prior to field work. The grower must identify and record the location of utilities on private land and flag/stake any underground utilities in the field that are within 200 feet of the agreed sample site. Responsibility for personnel safety will reside with the sampling company. The sampler is responsible for damage to property of the cooperating grower caused by field sampling which is the result of negligence of the sampler. Property damage caused by negligence on the part of the sampler will be repaired by the sampler.

12 Sample Handling and Custody

Soil samples will be delivered by contracted samplers to a contracted commercial laboratory. Sampling handling procedures as described in University of Idaho Bulletin 704 (Appendix D) ([HYPERLINK "http://www.cals.uidaho.edu/edComm/pdf/EXT/EXT0704.pdf"]) will be followed to insure that sample collection, holding and preservation time requirements are met. Coordination will be made with the laboratory prior top sample collection. For delivery to the lab, samples shall be placed in a cooler with reusable ice substitutes or with ice. If ice is used, sample containers must be placed inside a waterproof bag to prevent contact with melting ice. At no time shall the sampler store samples for more than 48 hours. Samplers may dry samples using methods acceptable to the laboratories and consistent with analytical methods. If the laboratory cannot analyze the sample within 48 hours of sample collection, the laboratory must preserve the samples by methods acceptable for the analytical method and standard practice.

The sampler will complete an Agricultural Soil Submission form approved by the analyzing laboratory for sample from each site and a COC record (Appendix A) for sample shipment. The soil submission form will include contact and billing information for ISWCC (not the grower/producer) and pertinent sample-specific information – sample identification number and the UIN corresponding to the producer/grower and specific field. The COC will include the project name, UIN, field sample number, sampled depth interval and sampled date for each sample. The date and time that the sample relinquished custody, and samplers name/initials will recorded on the form. Custody is relinquished when the sampler or their agent releases the sample container or cooler to a common carrier for shipment to the lab, or directly to the analyzing lab. The lab will return the original copy or scanned image of the COC at sample receipt or with reporting of results, indicating the time and date of sample reception, with the receivers name. ISWCC will maintain a record of sample custody with their field records.

13 Analytical Methods

Samples collected will be analyzed by a laboratory meeting ISWCC requirements; participation in the North American Laboratory Proficiency Testing Program (NAPT) and NAPT's Proficiency Assessment Program (PAP) for the requested methods. [REF _Ref336266976 \h] lists the requested parameters, reporting units, methods and method descriptions.

Table [SEQ Table * ARABIC]. Analytical method, container types, preservation method, and sampling holding times.

Parameter	Units	Analytical Method	Method Description
pH	Unit	S-2.10	1:2 Soil:Water Ratio
Soluble Salts	mmhos/cm		
Organic matter	%	S-9.10	LOI- Loss of Ignition
Lime	%	Fizz	Effervescence 2N HCl
Cation exchange Capacity - ECE	meq/100g	S-10.20	Measured
Nitrates – NO_3	ppm	S-3.10	Cadmium Reduction/KCl Extraction - FIA
Ammonium – NH_4	ppm	S-3.50	KCl Extraction/Exchangeable FIA
Potassium, Calcium, Magnesium, Sodium, Sulfate	ppm	S-5.10	Ammonium Acetate - ICP
Total Phosphorus	%	P-4.10	Nitric Acid/Peroxide Wet Ash
Zinc, Iron, Manganese, Copper	ppm	S-6.10	DTPA Extractable - ICP
Boron	ppm	S-6.10	DTPA Extractable/Sorbitol - ICP

Notes: mmhos/cm = micromhos/centimeter, ppm = parts per million, meq/100g = milliequivalents per 100 grams

FIA = Flow Injection Analysis, ICP – Inductive Coupled Plasma

DTPA = Diethylenetriaminepentaacatic acid

KCl = potassium chloride,

HCl = hydrochloric acid

14 Quality Control

Generally speaking, quality control is a means of measuring or estimating the potential variability involved with sample collection, analysis, or measurement activities in the field and in the laboratory. This section will discuss the various QC activities associated with this project

Adherence to this plan provides the framework to maintain quality control for the project. Quality assurance samples shall be analyzed and the results reported to ISWCC. The ISWCC contract with samplers and laboratories will allow the ISWCC to discuss results with the samplers and laboratories to determine the cause of potential problems and for development of corrective actions to address any irregularities with the result or entire sample collection and analysis process. Laboratories will perform standard internal quality control measures and will make available associated quality control information as needed.

Standard field quality assurance practices will be employed including duplicate/replicate and PE (fortified or "spiked" samples). Duplicate/replicate and PE samples will be submitted "blind" (not indicated as a QC sample)

14.1 Field QC Checks

Field QC samples, typically duplicates and blanks, will be submitted blind (not identified as a QC sample) for analysis. The overall field QC frequency will be at least 10% of the samples (10% duplicates). Submission of QC samples will be scheduled to ensure that at least three PE samples not including duplicate samples will be included with each batch of samples submitted to each laboratory. Field QC sample collection will be as evenly distributed as project conditions allow.

Duplicates

Duplicate samples are two samples collected from the same location, representing the same sampling event, and carried through all assessment and analytical procedures in an identical manner. Duplicates for this sampling project will consist of "splits" (subsamples drawn from the same initial volume of matrix). Sampling procedures outlined in [REF _Ref342552241 \r \h * MERGEFORMAT] will be followed for each sampling event to ensure consistency in sample collection. All relevant information will be recorded for the duplicates, just like the normal samples, in the field logbook or field sheet. Results from the field duplicate analysis will be included in the analytical report.

Field, Trip, and Equipment Blanks and Field Spikes

A blank is a sample of known matrix where the specific constituents requested for analysis are known to be absent or are present at concentrations less than the laboratory minimum limit of detection.

Field blanks are samples of blank matrix prepared in the field under identical conditions, processed the same, and included for analysis as a regular sample. Field blanks are a QC check to identify potential problems with the sample collection, handling, and analysis process. Field blanks will not be included for this project.

Equipment blanks are blank sample matrix passed through or over non dedicated sampling equipment to check the decontamination process between samples or sample sites. Equipment blanks may be collected when sampling equipment requiring decontamination (e.g., portable sampling equipment, mixing buckets, sampling shovel) are carried from field to field. When collected, equipment blanks will also be submitted blind for analysis and may be included in the overall 10% QC sample calculation. No equipment blanks will be required for this project. Soil sampling probe will be decontaminated by brushing clean of soil between borings. Sampling buckets for compositing samples will be cleaned between use and depth interval.

Field spikes are samples from a third-party vendor that include a known concentration of analytes of concern and may be submitted blind to the analyzing laboratory. These "spiked" samples may be included in the sample shipment to allow for an independent accuracy assessment or for inter-laboratory comparisons. Three PE "spiked" samples will accompany each sample shipment. PE samples will consist of local soil matrix fortified by the ARS laboratory, Kimberly Id, for blind submission with field samples.

14.2 Laboratory Quality Control Checks

Laboratory QC checks are routinely performed as part of the analysis process. The frequency and type of QC samples are often analysis method-dependent and include reagent blanks, matrix spikes, and internal laboratory splits. Analyzing laboratories will report any variance from QC limits impacting the quality of sample results and may report details of internal laboratory QC if requested. The analytical laboratory may provide appropriate sample containers, COC forms, sample labels as used, and any necessary container seals. A summary of laboratory QA/QC and data reports will be included in the final report submitted to DEQ and filed in TRIM.

Laboratory QC checks include internal checks for sample analysis activities, duplicate samples, and blanks. The following paragraphs describe common components of laboratory QA/QC programs.

Laboratory Blanks

A laboratory blank is a sample of known matrix where the specific constituents requested for analysis are known to be absent or are present at concentrations less than the laboratory minimum limit of detection. The laboratory blank is analyzed to evaluate the accuracy of the analysis.

Laboratory control samples (LCSs) are samples that contain a known concentration of analytes and are analyzed to assess the overall method performance. They undergo the same preparatory and determinative procedures as the project samples and are the primary indicator of laboratory performance. LCS recoveries are used to measure accuracy. The RPD for duplicate LCS recoveries is used to measure precision.

A **laboratory duplicate sample** is a sample that is split by the laboratory into two separate and identical samples. The two samples are analyzed and a comparison of the results (RPD) is used to assess laboratory precision.

A **matrix spike** (MS) sample has a known amount of the target analyte added to project matrix before analysis to assess possible matrix interferences on the analysis. Percent recoveries on MS

samples should be compared to percent recoveries of LCS samples. An MS/**matrix spike duplicate** (MSD) pair can be used to assess precision.

14.3 Data Analysis Quality Control Checks

The QC check data may be checked/reviewed for quality by the project manager or the project QAO at any time during the project and must be checked after all of the data are collected. Corrective actions, as needed, will be documented in the event that control limits are exceeded. Data qualifiers will be assigned following appropriate data verification/validation procedures. Any qualifiers added will be defined in the project summary/technical report and will be consistent with EPA QA/G-8 (EPA 2002b). The following checklists are included in Appendix C: Data Review—TRIM record #2012AEB2, Data Verification—TRIM record #2012AEB3, Data Validation—TRIM record #2012AEB4, and Project QAO Annual Audit— TRIM record #2012AEB5

15 Instrument/Equipment Testing, Inspection, and Maintenance

Laboratory instrument/equipment testing, inspection, and maintenance are performed and documented by the laboratory if/as required by the State of Idaho laboratory certification process. Procedures and schedules for preventive maintenance of sampling equipment are the responsibility of the laboratory. Each instrument or item of laboratory equipment will be maintained periodically to ensure accuracy. These procedures and frequency of performance are designated in the individual instrument manuals.

Project field instrument/equipment testing, inspection, and maintenance will be performed in accordance with the individual instrument/equipment manual.

16 Instrument/Equipment Calibration and Frequency

Laboratory instrument calibration is conducted and documented by the laboratories if/as required by the State of Idaho laboratory certification process.

Any field monitoring equipment utilized for the measurement of field parameters will be calibrated and maintained as recommended by the manufacturer, or as found in individual instrument/equipment manuals, to ensure accuracy within specified limits. Calibration details will be recorded in the field logbook or field sheet. Field equipment used to collect samples will be calibrated according to manufacturers' procedures or internal guidelines at the start of each field day (at a minimum) and/or at intervals recommended by the manufacturer or found in individual instrument/equipment manuals. Each instrument or item will be visually inspected by field sampling personnel for damage and operability prior to each sampling event.

17 Inspection/Acceptance of Supplies and Consumables

The supplies and consumable items required for monitoring projects will be consistent with the appropriate sample collection procedure described in this document or included in [REF _Ref342552241 \r \h * MERGEFORMAT]. All sample containers will be obtained from or approved by the the analytical laboratory, laboratory supplier, or laboratory equipment provider. All sampling supplies and consumable items will be new, inspected for acceptance by the project manager prior to use, and used for sampling as per the approved procedure.

18 Nondirect Measurements and Data Acquisition

Nondirect measurements and data acquisition refer to data obtained *for use by the project* from existing data sources, not directly measured or generated in the scope of this project. This type of data is often referred to as "existing data." Examples of this type of data include data obtained from existing sources or databases (either from within or from outside DEQ or ISWCC) and data obtained by others and offered or presented to DEQ or ISWCC.

Published Soil Survey Descriptions and Soil Survey maps are examples of these nondirect measurements and data use within this study. Soil Survey descriptions identify and describe soil mapping units included on published soil survey maps. These descriptions are used to delineate soil texture boundaries identified on soil survey maps generated using USDA NRCS published soil survey data. These data are used as guides to sample site selection as described in Section 10 – Sampling Process Design.

19 Data Management

Documentation of field and laboratory work for each soil sampling site will consist of submittal of the following documents to the ISWCC by the soil sampling contractor:

- A completed Sampling Field Form and Soil Boring Log (Appendix A).
- Copies of soil survey maps and interpretive descriptions prepared or compiled by ISWCC, notes or related information collected by the sampler during the sampling process.
- A copy of the analytical results shall be provided to the Producer and the ISWCC. All forms and related information will be maintained by the ISWCC to insure that minimum records necessary for technical analysis of the data, documentation to facilitate repeat sampling, and possible audit of financial data are available.
- The completed Grower Agreement, and Deep Soil Sampling Program Questionnaire.

The soil sampling contractor will provide a copy of the laboratory analysis to the ISWCC and the producer. The ISWCC will analyze soil test results and provide the grower any summary, direction or recommendations as deemed necessary by the ISWCC.

Commented [A8]: It would be preferable to have a different method of getting results to the grower that does not require maintaining a list of growers with the UINs, (SCK)

The ISWCC will summarize soil sample data for all samples taken during the year and provide DEQ the cumulated results identifying resource concerns and outlining intended remedial action.

The ISWCC will enter sample and analytical data into a computer database. Computerized data will include technical data necessary for interpretation of the results by the project. Such data will include sample ID, sample depth; sampling date; analytical results; and Soil Sampling Field Form (Appendix A).

Quality Assurance forms as completed: Data Review—TRIM record #2012AEB2, Data Verification—TRIM record #2012AEB3, Data Validation—TRIM record #2012AEB4, and Project QAO Annual Audit— TRIM record #2012AEB5 will be entered into TRIM as part of the DEQ QAPP recordkeeping.

20 Assessment and Response Actions

Assessment of the project QAPP will be performed by ISWCC assessment of field notes and laboratory reports and by conducting field and laboratory audits where possible and resources allow. This assessment will be completed or directed by the QAO. Any errors or inconsistencies identified in the field notes will be discussed with ISWCC and corrective action suggested. The QAO will perform assessment of the project independently of the project manager.

A note to the file will be included with the field notes and laboratory reports if any follow-up QA activities regarding field notes or laboratory reports are required and conducted.

The QAO shall audit the QAPP annually for project that continue beyond one field season, per the DEQ QMP, to determine if revision is necessary. The project manager should also review the project QAPP on an annual basis to ensure that the document continues to meet the needs of the data user(s). Audits and reports shall utilize the appropriate checklist forms located in [REF _Ref342552156 \r \h] and will be documented in TRIM, indicating the date of the audit and listing identified issues or concerns in accordance with the QMP. If the project QAPP and/or FSP requires revision as a result of this audit or review, these actions will be taken and the revised QAPP submitted for approval prior to implementation, per the DEQ QMP (DEQ 2012a).

21 Reports to Management

As part of funding contract fulfillment for DEQ subcontract S544 (TRIM 2016AHR276), ISWCC will submit a final report including the following deliverables:

- A description of the project,
- A description of sampling procedures and protocols,
- A detailed table showing soil analysis results, cropping history, and fertilizer applications for each field sampled, and
- A summery table showing ranges of nitrate values and other parameters.

22 Data Review, Verification, and Validation

Data review will be conducted by the ISWCC Project manager and deliverables to DEQ will be performed by the DEQ Project manager

Data verification will be conducted by the ISWCC Project manager and deliverables to DEQ will be performed by the DEQ Project manager with support of the Project QAO as needed.

Data validation shall be conducted by the project QAO following data review and verification

Data review, verification, and validation tasks are assigned to specific project staff, such as the project manager or project QAO, in section 23 of the project QAPP.

The level of documentation required for a specific project data review, verification, validation, and reconciliation effort is specified below. This level of documentation is determined by the project manager, in consultation with the regional or program manager, consistent with the "graded approach" used by DEQ in implementing the quality management system (QMS).

Those assigned to perform project data review, verification, and validation *shall use the associated checklist provided in the appendices to perform and document* the effort in the associated project TRIM file system.

23 Review, Verification, and Validation Methods

Data review, verification, and validation efforts are based on the analytical support determined to be necessary in the planning stages of the project. DEQ personnel performing data verification and validation are encouraged to review the following guidance documents:

- EPA QA/G-8 (EPA 2002b) for guidance on methods for this task.
- Appendix A of EPA's *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA 2009)
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 2004).
- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA 2008).

Data review for data and information collected under this QAPP shall be performed by the project manager(s) using the data review checklist found in [REF _Ref342552156 \r \h * MERGEFORMAT]. This review will also include evaluation of supplied laboratory data reports. Data review will include the following activities, at a minimum:

- An examination of project data, identifying errors in data entry, storage, calculation, reduction, transformation, or transcription.
- An examination to ensure all required sample information is documented and available, in preparation for the verification, validation, and assessment process. This includes pertinent project information concerning blanks, matrixes, temperature requirements, duplicates, preservatives, shipping dates, holding times, chain-of-custody records, etc.

- An examination to identify if all required nondirect measurement data (existing data) information *and supporting documentation*, as required by the project QAPP, have been received and are available for the verification and validation process.
- A completeness check to determine if any data deficiencies exist, such as missing data or compromised data integrity, due to issues such as loss in acquisition, storage, or processing.
- An examination to ensure all necessary analytical laboratory support documentation, as set forth and stipulated in the project QAPP, have been received from the applicable laboratories.
- An examination to identify programming and/or software related errors, if applicable to the project.

Data verification for data and information collected under this QAPP shall be performed by the project manager(s) using the data verification checklist found in [REF _Ref342552156 \r \h * MERGEFORMAT]. The general focus of the process is to identify if all requirements specified in the project QAPP, associated procedures, and project contractual requirements (if applicable), have been met, and if not, to determine the extent to which requirements failed to be achieved. Data verification will include the following activities, at a minimum:

- Verification that all data completeness criteria, as stated in the project QAPP, have been satisfied. This shall include items such as the number of samples, number of QC samples such as spikes and duplicates, and chain-of-custody record continuity.
- Verification that the values of individual data points, and/or comparison calculations such as RPD, meet the criteria specified in the QAPP.
- Verification that the required analytical methods, as listed in the project QAPP, correspond to the analytical methods employed by the laboratory, as recorded in laboratory reports.
- Verification that QAPP requirements relative to laboratory analytical support documentation have been satisfied by the reporting laboratory, including the correct application of data qualifiers.
- Verification that all supporting information and documentation for nondirect measurement data (existing data) meet the requirements of the QAPP. If not, identify any limitations or restriction on the use of such data.
- Verification that data and sample collection practices adhered to procedural requirements, to include a review of project logs and field notes, as applicable.
- Verification that sample handling activities conform to QAPP requirements. Examples include sample shipment timelines, sample holding times, preservatives, number of samples obtained, duplicate or split sample frequency, and chain-of-custody documentation.
- Verification that data calculation and handling activities conform to QAPP requirements. Examples include correct use of mathematical formulas and numerical methods, correct use of programs and programing, and correct application of database information transfers.
- Verification that any remaining or unique project QAPP or procedural requirements have been met, and if not, determine the extent to which these requirements failed to be achieved.
- Determine and document any limitations on the use of the project data.

Data validation for data and information collected under this QAPP shall be performed by the project QAO using the data validation checklist found in [REF _Ref342552156 \r \h * MERGEFORMAT]. The general focus of the process is to identify if the quality of the project data meets the needs of the data user and the associated decision makers. The data validation effort for this project shall include a minimum of 10% of all project data with a goal of 20%, except as noted specifically below. Data validation will include the following activities, at a minimum:

- An evaluation and examination of all (100%) of obtained field QC sample results, such as duplicates and trip blanks, etc., followed by assignment (if necessary) of appropriate data qualifiers to these data based on project criteria.
- A review of project analytical laboratory reports and data, including the assigned data qualifiers, to evaluate the data quality with respect to the project DQOs. Assign data qualifiers to individual data values as necessary and appropriate.
- A review of the outcome of the data verification effort to evaluate the impact on data quality with respect to the DQOs.
- A determination, when necessary and where possible, of the reasons for any failure to meet methodological, procedural, or contractual requirements and an evaluation of the impact of such failure on the overall data.
- A comparison of the project DQOs, as defined in the project QAPP, to the data obtained by the project to assess the adequacy of the data (new or existing) in relation to their intended use.
- A determination of the extent to which any nondirect measurement data (existing data), and the accompanying supporting information and documentation, meet the requirements of the data user. Specifically, does the quality of the existing data adequately support the needs of the project and support the intended use of the data for the project.
- Determine and document any limitations on the use of the project data.
- Determine the adequacy of the data to proceed on to the data assessment and reconciliation with user requirements phase.

Any potentially unacceptable departures from the requirements of the project QAPP will be noted during the data review, verification, and validation process. If the project manager or the project QAO determines the data do not meet the needs of the project or the DQOs of the QAPP and/or if the conclusions drawn from the data do not appear to be reasonable, the project manager and the QAO shall immediately report such findings to the appropriate regional manager and/or State Office program manager to determine the necessary corrective actions. Documentation of such findings and activities shall be maintained in accordance with the DEQ QMP.

24 Reconciliation with User Requirements

Data quality assessment (DQA) will be performed in accordance with this QAPP and the DEQ QMP (DEQ 2012a). Additional guidance for conducting data assessment can be found in EPA QA/G-9R or EPA QA/G-9S (EPA 2006a, b).

The DQA will be performed (at a minimum) by the project manager and the project QAO to determine if the project data set is of the right type, quality, and quantity to achieve the objectives of the project and can confidently be used to make an informed decision.

Information and findings associated with the project data review, verification, and validation efforts shall be considered during the data assessment process.

When DQOs are not met, the project manager will discuss appropriate corrective actions with project staff, project management, and with the analytical laboratory. Corrective actions may be initiated to suggest improvements to data collection activities, data and sample handling techniques, internal laboratory quality procedures, etc., to solve quality issues.

If the project manager or the QAO decide the project data do not meet the project needs or the QAPP quality objectives and/or if the conclusions drawn from the data do not appear to be reasonable, the project manager and the QAO shall immediately report such findings to the appropriate regional manager and/or State Office program manager to determine and document the necessary corrective actions.

If sampling activities require revision, the project QAPP and/or FSP will be revised as necessary. Following revision, and prior to implementation, the revised project QAPP and/or FSP must be re-approved in accordance with the DEQ QMP (DEQ 2012a).

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25 References

DEQ (Idaho Department of Environmental Quality). 2012a. *Quality Management Plan*. Boise, ID: DEQ. TRIM record number 2012AEC1. Available at [HYPERLINK "http://insidedeq.deq-intra/director/documents/quality-mgmt-plan-rev-3-2012.pdf"].

DEQ (Idaho Department of Environmental Quality). 2012b. *Health and Safety Plan: Hamilton Gas Field Ground Water Monitoring Activities*. Boise, ID: DEQ. TRIM Record Number 2012AGV1044.

DEQ (Idaho Department of Environmental Quality). No date (current version). "Retention Schedule." Boise, ID: DEQ. TRIM record number 2010AIC3.

Division of Building Safety. 2006. *Idaho General Safety and Health Standards*, revision 3. Meridian, ID: Division of Building Safety in cooperation with the Idaho Industrial Commission. Available at [HYPERLINK "http://dbs.idaho.gov/safety_code/index.html"].

EPA (US Environmental Protection Agency). 2001. *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Washington DC: EPA, Office of Environmental Information. EPA/240/B-01/003. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/r5-final.pdf"].

EPA (US Environmental Protection Agency). 2002a. *Guidance for Quality Assurance Project Plans* (EPA QA/G-5). Washington DC: EPA, Office of Environmental Information. EPA/240/R-02/009. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/g5-final.pdf"].

EPA (US Environmental Protection Agency). 2002b. *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8). Washington DC: EPA, Office of Environmental Information. EPA/240/R-02/004. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/g8-final.pdf"].

EPA (US Environmental Protection Agency). 2004. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (OSWER 9240.1-45). Washington DC: EPA, Office of Superfund Remediation and Technology Innovation. EPA 540-R-04-004. Available at [HYPERLINK "http://www.epa.gov/superfund/programs/clp/download/inorgfg10-08-04.pdf"].

EPA (US Environmental Protection Agency). 2006a. *Data Quality Assessment: A Reviewer's Guide* (EPA QA/G-9R). Washington DC: EPA, Office of Environmental Information. EPA/240/B-06/002. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/g9r-final.pdf"].

EPA (US Environmental Protection Agency). 2006b. *Data Quality Assessment: Statistical Methods for Practitioners* (QA/G-9S). Washington, DC: EPA, Office of Environmental Information. EPA/240/B-06/003. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/g9s-final.pdf"].

Commented [EJ9]: AUTHOR: If the project has a project-specific health and safety plan, then enter the reference to that document in this section. If not, then delete this entry.

EPA (US Environmental Protection Agency). 2006c. *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA QA/G-4). Washington, DC: EPA, Office of Environmental Information. EPA/240/B-06/001. Available at [HYPERLINK "http://www.epa.gov/quality/qs-docs/g4-final.pdf"].

EPA (US Environmental Protection Agency). 2008. *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (OSWER 9240.1-48). Washington DC: EPA, Office of Superfund Remediation and Technology Innovation. EPA 540-R-08-01. Available at [HYPERLINK "http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf"].

EPA (US Environmental Protection Agency). 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (OSWER No. 9200.1-85). Washington, DC: EPA, Office of Solid Waste and Emergency Response. EPA 540-R-08-005. Available at [HYPERLINK "http://www.epa.gov/superfund/policy/pdfs/EPA-540-R-08-005.pdf"].

IDWR (Idaho Department of Water Resources). January 2005. Nitrate Overview for the Statewide Ambient Ground Water Quality Monitoring Program, 1990-2003. Boise, Idaho: IDWR.

Lower Yakima Valley Ground Water Advisory Committee. March 2014. Deep Soil Sampling Plan - Lower Yakima Valley Ground Water Management Area. Zillah, Washington.

Shoshone-Bannock Tribe. October 2014. Shoshone-Bannock Fort Hall Post-Harvest Nitrate Deep Soil Sampling Project. Fort Hall, Idaho.

Lewis Soil Conservation District. June 2012. LSCD Final Report - Laboratory Nitrate Sampling, Analyses, and Monitoring. Nezperce, Idaho

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Appendix A. Field Data Collection Forms

Included in this appendix:

- Deep Soil Sampling Grower Questionnaire
- Soil Sampling Field Form
- Soil Boring Log
- Sample Chain Of Custody Form
- Western Laboratories Agricultural Soil Submission Form

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Deep Soil Sampling Program Questionnaire

General:

As you may know, the aquifers in the Marsh Creek, Minidoka, and Twin Falls Nitrate Priority Areas have been shown to have ground water nitrate concerns. Nitrogen that has migrated below the root zone is useless to crops and can be damaging to water quality and drinking water supplies. ISWCC designed this grower survey to help everyone better understand current production methods and provide guidance to assist in improved farming practices. The correlation of the questionnaire with the Deep Soil Sampling Program is an attempt to understand the relationships between the amount and form of nitrogen applied, the application method and timing, the irrigation method, the amount of nitrogen required for plant growth based on cropping patterns, and the quantity of nitrogen that has migrated below the root zone. Participation will be anonymously structured as explained below.

ISWCC is encouraging broad producer participation in the Deep Soil Sampling Program – at no cost to the grower. Nitrogen is an expensive input and once it migrates below the root zone it becomes an expensive loss. The results of your soil samples can help guide your input decisions and potentially reduce your nutrient expenses. A grower survey has been designed to better understand current production methods and assist in improved farming practices, where they may be needed to reduce nitrates in groundwater. For those producers who, for whatever reason chose not to participate in the Deep Soil Sampling Program, ISWCC would still encourage participation through completion of the landowner survey to help us understand current production practices. This questionnaire is intended for either growers who participate in the soil sampling project and those growers who choose not to participate.

We are thanking you in advance for participating in the Marsh Creek /Minidoka/Twin Falls Deep Soil Sampling Program and for completing the questionnaire. As mentioned above, samples will be taken on your property and analyzed at no cost to you, if you participate in the soil sampling program. We are also interested in knowing your agricultural practices such as crops grown, plant nutrients applied, irrigation practices, and soil type. While information gathered in the study will be summarized in the resulting report and used in a collective manner to help describe farming operations, the report will not include specific data tied to an identifiable parcel or location~~While information gathered in the study will be summarized, your specific data will be confidential and will not be tied to a specifically identifiable parcel or location. Site specific information requested on the questionnaire will be held confidentially - it will not be public information. It will be summarized and used in a collective manner to help describe farming operations in the resulting report~~.

We have developed a procedure designed to separate your identity and the location of the soil sample locations from the soil sample results and your participation on the questionnaire ~~We have developed a procedure to protect your identity and the location of the soil sample locations. This protects your identity in your participation on the questionnaire as well~~. You are welcome to share that information with the ISWCC or anyone else, but are under no obligation to do so.

Please keep the attached Unique Identification Numbers (UIN). They should be filed in a safe location so that you can refer to them to review your results of the soil sampling. You will be unable to identify your sample results with the UIN~~With these numbers, you will be the only person that can identify your soil samples~~. It is not necessary to include all of the fields on your farm. You can select as many qualified fields to include in the

Deep Soil Sampling Program Questionnaire

study as you feel comfortable with and as funding allows. If you decide not to include all fields in the study, be sure to convey that information to the person collecting the samples when they arrive.

Place one UIN sticker on the questionnaire and return it in the envelope addressed to Carolyn Firth, ID Soil and Water Conservation Commission, 1361 East 16th St., Burley, ID 83318. Do not include your name or return address. When the samples are collected, give the UIN stickers to the sampler who will attach them to the sample containers.

When all of the samples have been collected, analyzed, and tabulated they will be posted on a website or published in a format suitable for public access. The results from your farm will be identified only by the UIN~~The results from your farm will be identified by the number only you will know~~.

Participation in the Deep Soil Sampling Program can benefit you economically, as the analytical results will help determine whether or not expensive nitrogen is being applied in excess of what your crop can utilize.

Thank you for your participation.

Deep Soil Sampling Program Questionnaire

WORKSHEET FOR IRRIGATED CROPLAND

Unique Identification Number (UIN) (Place UIN Here) Date: _____

Nitrate Priority Area: _____

Field History

Years Owned/Farmed_____ Soil Type (if know): _____
Currently Soil Testing ___Yes ___No If yes, how often?_____
Number of Acres: _____
Tillage Practices for Crop Cycle

Current Crop (2016)_____ Tons/Bushels/Sacks/Acre_____ actual or planned (circle one)

Cropping History (Include Double Cropping)

Crop Rotation:
2013 Crop 1_____Tons/Bushels/Sacks/Acre _____
Crop 2 (if applicable)_____Tons/Bushels/Sacks/Acre_____
2014 Crop 1_____Tons/Bushels/Sacks/Acre _____
Crop 2 (if applicable)_____Tons/Bushels/Sacks/Acre_____
2015 Crop 1_____Tons/Bushels/Sacks/Acre _____
Crop 2 (if applicable)_____Tons/Bushels/Sacks/Acre_____
2016 Crop 1_____Tons/Bushels/Sacks/Acre _____
Crop 2 (if applicable)_____Tons/Bushels/Sacks/Acre_____

Current method of scheduling irrigation:

_____ ET; _____ soil moisture sensors; _____ Routine _____ hr. sets; Weather Stations_____

Current Irrigation System: Years of use on crop? _____

___Flood Irrigation
___Rill Irrigation
___ Solid Set above canopy - ___Impact Sprinklers, ___ Micro spray ___Rotators
___Solid Set below canopy - ___Impact Sprinklers, ___ Micro spray ___Rotators
___Wheel lines ___Impact Sprinklers ___Rotators
___ Hand lines ___Impact Sprinklers ___Rotators
___ Linear move ___Impact Sprinklers, ___ Micro spray ___Rotators
___ Drip ___ tube,___ tape,___ bury line___ above ground line
___ Pivot ___Impact Sprinklers, ___ Micro spray ___Rotators

___ Pod line____Impact Sprinklers ___Rotators

___ Other: _____

Deep Soil Sampling Program Questionnaire

Previous Irrigation System: **Years of use on crop? _____**

___Flood Irrigation
___Rill Irrigation
___ Solid Set above canopy - ___Impact Sprinklers, ___ Micro spray ___Rotators
___Solid Set below canopy - ___Impact Sprinklers, ___ Micro spray ___Rotators
____Wheel lines ____Impact Sprinklers ____Rotators
____ Hand lines ____Impact Sprinklers ____Rotators
____ Linear move ____Impact Sprinklers, ____ Micro spray ____Rotators
____ Drip ____ tube,____ tape,____ bury line____ above ground line
___ Pivot ____Impact Sprinklers, ___ Micro spray ____Rotators
___ Pod line____Impact Sprinklers ____Rotators
____ Other: _____

Nitrogen applications
Manure - Liquid

Year	Gallons/Acre applied	#N/1000 gal	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Manure-Solid

Year	Tons/Acre applied	#N/ton	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Commercial Fertilizer

Year	Material type?	#N/Acre applied	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Biosolids

Year	Tons/Acre applied	#N/ton	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Compost

Year	Tons/Acre applied	#N/ton	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Other

Year	Tons applied	#/ton	How applied	Hours to incorporation	notes
2016					
2015					
2014					
2013					
2012					

Please provide additional information if appropriate such as split applications, starter, side dress, etc._____
_____
_____

Comments:_____
_____
_____

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Soil Sampling Field Form

Leasee: _____ Phone: _____

Address: _____ Allotment Number: _____

Sampled By: _____ Date: _____

Field Number/Name: _____ Crop grown this year: _____

Crop grown last year _____ Commercial fertilizer applied ____ Y ____ N What Kind: _____

Nitrogen application rate in lbs/ac. _____

Animal waste applied ____ Y ____ N Liquid ____ Solid ____ N application rate in lbs N/acre _____

Crop Harvested: ___ Y ___ N Date: _____ Fertilizer/animal waste applied since harvest? ___ Y ___ N

Irrigation Water applied since harvest? ____ Y ____ N Precipitation since harvest ____ Y ____ N

If precipitation fell following harvest, how much and when: _____

Irrigation type: _____

Irrigation Water Management (IWM) monitoring systems and practices in place: ____ Y ____ N

General Level of IWM management: ____ High ____ Medium ____ Low

Comments: _____

_____

Soil Map for selected field available: ____ Y ____ N Sample Zone Delineated: ____ Y ____ N

Four (4) Sampling Sites identified within the sampling zone: ____ Y ____ N

Commented [A10]: If this is referring to the grower I believe this information needs to be removed and replaced with UIN. (SCK)

Concurrence of Sampling Zone Selection. Initials: Sampler _____, Leasee _____,

Tribal Representative _____

Commented [A11]: remove

GPS Coordinates:

Site 1: _____ Site 2: _____

Site 3: _____ Site 4: _____

Commented [A12]: If this is not necessary I believe it should be removed. (SCK)

Sampling Results – Site 1, Sampling Date: _____

Sample Depth	Refusal Y/N	If refused, depth sampled
3rd foot: 26 in. – 36 in.		
4th foot: 37 in. – 48 in.		
5th foot: 49 in. – 60 in.		

Sampling Results – Site 2, Sampling Date: _____

Sample Depth	Refusal Y/N	If refused, depth sampled
3rd foot: 26 in. – 36 in.		
4th foot: 37 in. – 48 in.		
5th foot: 49 in. – 60 in.		

Sampling Results – Site 3, Sampling Date: _____

Sample Depth	Refusal Y/N	If refused, depth sampled
3rd foot: 26 in. – 36 in.		
4th foot: 37 in. – 48 in.		
5th foot: 49 in. – 60 in.		

Sampling Results – Site 4, Sampling Date: _____

Sample Depth	Refusal Y/N	If refused, depth sampled
3rd foot: 26 in. – 36 in.		
4th foot: 37 in. – 48 in.		
5th foot: 49 in. – 60 in.		

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Date consolidated samples were sent to the laboratory: _____.

Chain of Custody Form Completed. _____ Y _____ N

Name NAPT Laboratory conducting the analysis: _____

_____ _____

Signature of Sampler Date

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Soil Boring Log

Bar Code (Place Bar Code Here)

Boring Number: _____

Boring Date: _____ Boring Logged by: _____

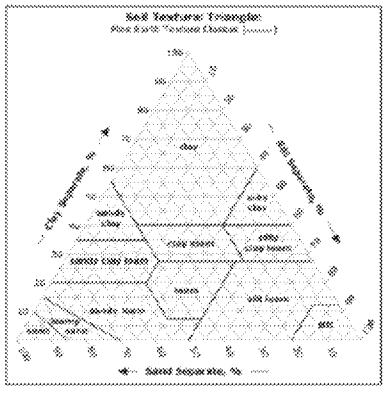
Boring and Sampling Device (example: AMS 9100 Ag Probe with 2-inch tube sampler) _____

_____

NRCS Soil Series (soil type) _____

Describe each soil sample.

Depth in ft	Munsel color	Consistence	Moisture	Texture	Other
0-1					
1-2					
2-3					
3-4					
4-5					
5-6					
6-7					
7-8					



TEXTURE MODIFIERS - Conventions for using "Rock Fragment Texture Modifiers" and for using textural adjectives that correspond to "% volume" ranges for **Rock Fragments - Size and Quantity.**

Fragment Content % By Volume	Rock Fragment Modifier Usage
< 15	No texture adjective is used (none only, e.g., loam).
15 to < 35	Use adjective for appropriate size, e.g., gravelly.
35 to < 60	Use "very" with the appropriate size adjective, e.g., very gravelly.
60 to < 90	Use "extremely" with the appropriate size adjective, e.g., extremely gravelly.

Moisture options: D=dry
M=moist
Dp=damp
W=wet

Consistance options:
L=loose, S=soft, SH=slightly hard, HA=hard, EH=extremely hard, FR=friable, FI=firm; VFI=very firm; C=cemented.
See Field Book for Describing and Sampling Soils, NRCS, August 2011.

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Chain of Custody Form

Marsh Creek/ Minidoka or **Twin Falls Post Harvest Deep Soil Sampling Project.**

Unique ID Number	Field Number	Sample Depth	Sample Date

Date and Time Sample(s) Relinquished _____

Relinquished By _____

Date and Time Samples Received _____

Received By _____

Date and time Received by the Laboratory _____

Received By _____

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Appendix B. Nitrate Priority Area Maps and County FIPS Codes

Included in this appendix:

- Figure B1 - Marsh Creek and Minidoka NPA, Cassia and Minidoka Counties
- Figure B2 - Twin Falls NPA and source water delineations, Twin Falls County
- Table B1 – Idaho County FIPS codes

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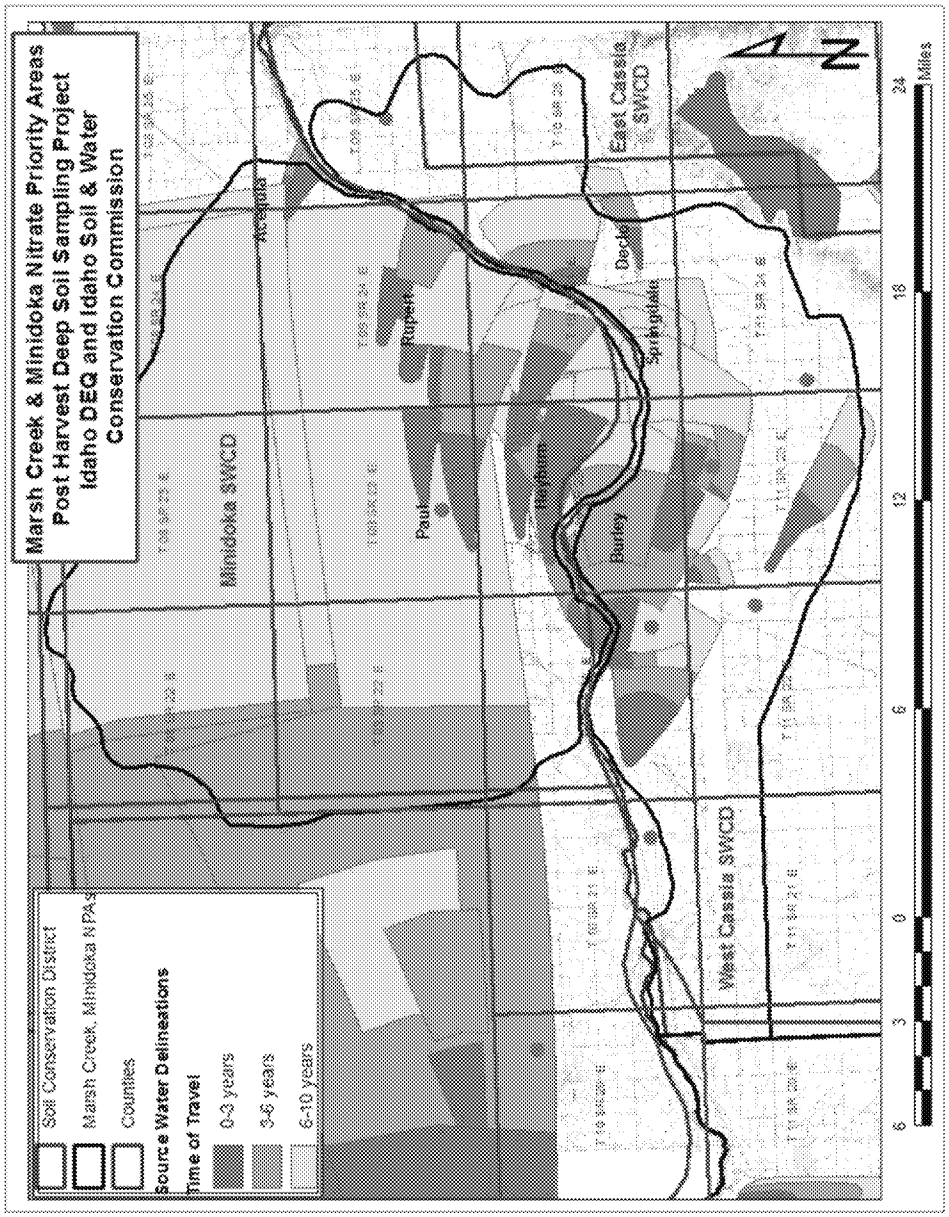

Figure B [SEQ Figure_A * ARABIC] Marsh Creek and Minidoka NPAs, Cassia and Minidoka Counties.

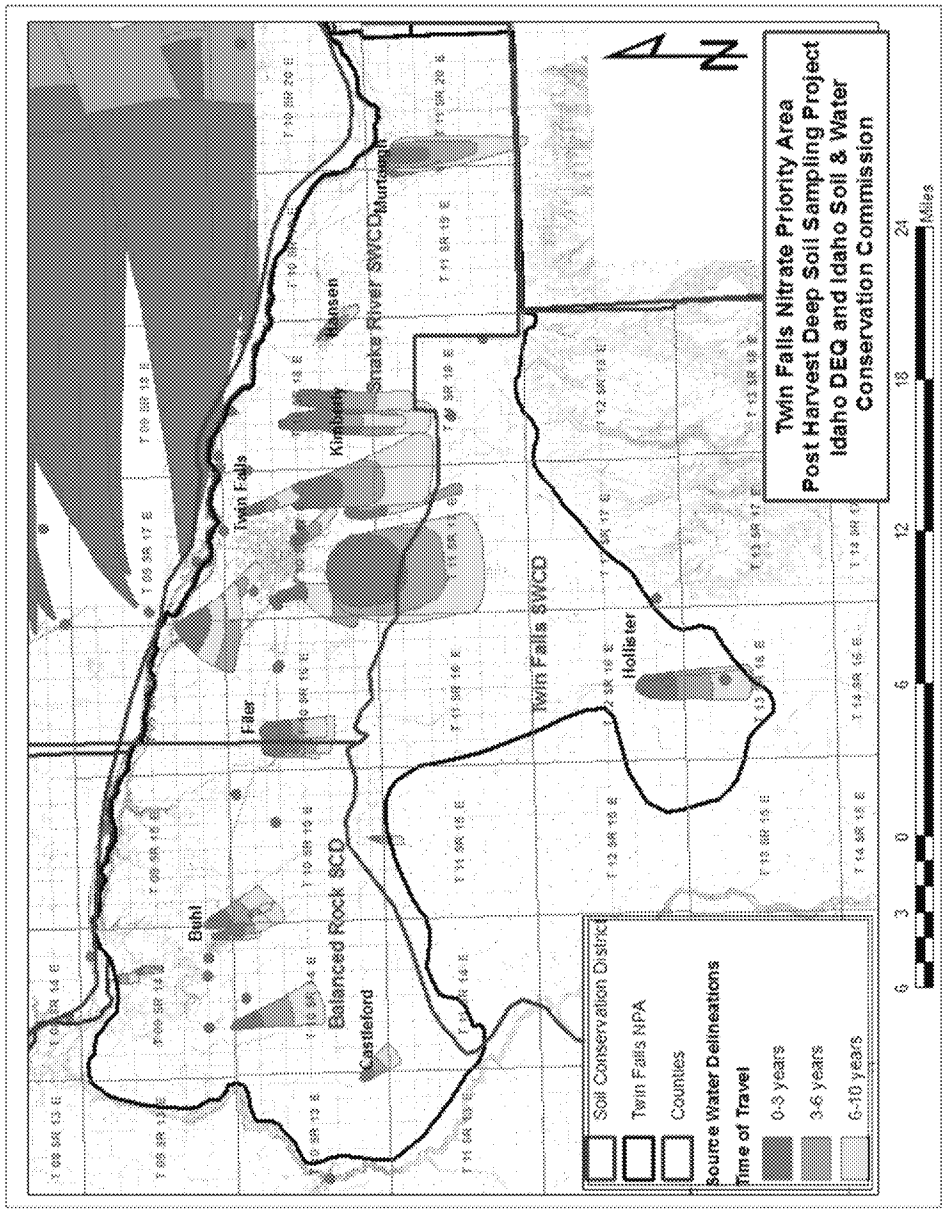

Figure B [SEQ Figure_A * ARABIC] Twin Falls NPA, Twin Falls County.

Table B1. Idaho County FIPS Codes

County	Count Code	County	Count Code
Ada	1	Gem	45
Adams	3	Gooding	47
Bannock	5	Idaho	49
Bear Lake	7	Jefferson	51
Benewah	9	Jerome	53
Bingham	11	Kootenai	55
Blane	13	Latah	57
Boise	15	Lemhi	59
Bonner	17	Lewis	61
Bonneville	19	Lincoln	63
Boundary	21	Madison	65
Butte	23	Minidoka	67
Camas	25	Nez Perce	69
Canyon	27	Oneida	71
Caribou	29	Owyhee	73
Cassia	31	Payette	75
Clark	33	Power	77
Clearwater	35	Shoshone	79
Custer	37	Teton	81
Elmore	39	Twin Falls	83
Franklin	41	Valley	85
Fremont	43	Washington	87

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Appendix C. Project Checklists

Commented [EJ13]: AUTHOR: Depending on which appendices you end up with in your QAPP, you may need to reorder the appendices. They should correspond with the order they are first mentioned in the body of the document (i.e., A is called out first, B second, etc.)

All checklists in this appendix are available for download and use by project staff as standalone electronic documents, from either the DEQ TRIM system or the DEQ Quality System website: [HYPERLINK "http://insidedeq.deq-intra/director/quality.htm"].

Prior to using an activity checklist, project staff should review the applicable requirements listed in the project QAPP and the QMP.

The following checklists are included in this appendix:

- Data Review—TRIM record #2012AEB2
- Data Verification—TRIM record #2012AEB3
- Data Validation—TRIM record #2012AEB4
- Project QAO Annual Audit—TRIM record #2012AEB5

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DEQ QAPP/FSP Checklist—Data Review

The individual assigned in the project QAPP/FSP to perform project **data review** *shall complete and file this checklist in the appropriate project TRIM system files.* Project personnel are encouraged to expand this standard list, as project conditions warrant.

Printed Name of Staff Performing Data Review	Date Completed
Project QAPP/FSP Title	QAPP/FSP TRIM Record #

Check the following review boxes following completion of each listed task.

Check *yes* if the task was completed without any noted discrepancies. Otherwise, check *no* and include a description of the discrepancy in the space provided. Use additional sheets as necessary.

Yes	No	
☐	☐	Verify that the approved current project QAPP, including a copy of the signed approval signature page, is currently filed in the TRIM system. Also, verify the project information has been entered into the QAO project tracker found at TRIM record #2012AEB8. If the QAPP is not filed in TRIM, or the QAO tracker is not current, immediately inform the DEQ QA manager.
☐	☐	If the project utilizes an FSP, verify that the approved project FSP, including a copy of the signed approval signature page, is currently filed in the TRIM system. Also, verify the project information has been entered into the QAO project tracker found at TRIM record #2012AEB8. If the FSP is not filed in TRIM, or the QAO tracker is not current, immediately inform the DEQ QA manager.
☐	☐	Examination and review the project QAPP (and FSP, if used) to determine if additional project-specific data *review* requirements apply. Update this checklist to include all such items.
☐	☐	Examine project data, identifying errors in data entry, storage, calculation, reduction, transformation, or transcription.

Yes	No	
☐	☐	Ensure all required sample information is documented and available, in preparation for the verification, validation, and assessment process. This includes pertinent project information concerning blanks, matrixes, temperature requirements, duplicates, preservatives, shipping dates, holding times, chain-of-custody records, etc.
☐	☐	Identify if all required nondirect measurement data (existing data) information *and supporting documentation*, as required by the project QAPP (and FSP, if used), have been received and are available for the verification and validation process.
☐	☐	Determine if any data deficiencies exist, such as missing data or compromised data integrity, due to issues such as loss in acquisition, storage, or processing.
☐	☐	Ensure all necessary analytical laboratory support documentation, as set forth and stipulated in the project QAPP (and FSP, if used), have been received from the applicable laboratories.
☐	☐	Identify programming and/or software related errors, if applicable to the project.
☐	☐	Ensure that all deficiencies and/or conditions adverse to quality determined during the project data *review* process have been communicated to project management and are listed on this checklist or attached for inclusion in the TRIM record system.
☐	☐	Verify that a copy of this data review checklist has been provided to the project manager for deficiency resolution and placed in the project TRIM file system. Note that additional data review actions may be required based on the checklist findings, such as a corrective action plan/reports, etc. The project manager shall consult the DEQ QMP and proceed accordingly.

Please list any additional comments below. Attach additional sheets as necessary.

DEQ QAPP/FSP Checklist—Data Verification

The individual assigned in the project QAPP/FSP to perform project **data verification** *shall complete and file this checklist in the appropriate project TRIM system files.* Project personnel are encouraged to expand this standard list, as project conditions warrant.

Printed Name of Staff Performing Data Verification	Date Completed
Project QAPP/FSP Title	QAPP/FSP TRIM Record #

Check the following review boxes following completion of each listed task.

Check *yes* if the task was completed without any noted discrepancies. Otherwise, check *no* and include a description of the discrepancy in the space provided. Use additional sheets as necessary.

Yes	No	
☐	☐	Examine and review the project QAPP (and FSP, if used) to determine if additional project specific data *verification* requirements apply. Update this checklist to include all such items.
☐	☐	Verify that all data completeness criteria, as stated in the project QAPP (and FSP, if used), have been satisfied. This shall include items such as the number of samples, number of QC samples such as spikes and duplicates, and chain-of-custody record continuity.
☐	☐	Verify that the values of individual data points, and/or comparison calculations such as RPD, meet the criteria specified in the QAPP (and FSP, if used).
☐	☐	Verify that the required analytical methods, as listed in the project QAPP (and FSP, if used) correspond to the analytical methods employed by the laboratory, as recorded in laboratory reports.
☐	☐	Verify that QAPP (and FSP, if used) requirements relative to laboratory analytical support documentation have been satisfied by the reporting laboratory, including the correct application of data qualifiers.
☐	☐	Verify that all supporting information and documentation for nondirect measurement data (existing data) meet the requirements of the QAPP (and FSP, if used). If not, identify any limitations or restriction on the use of such data.

Yes	No	
☐	☐	Verify that data and sample collection practices adhered to procedural requirements, to include a review of project logs and field notes, as applicable.
☐	☐	Verify that sample handling activities conform to QAPP (and FSP, if used) requirements. Examples include sample shipment timelines, sample holding times, preservatives, number of samples obtained, duplicate or split sample frequency, and chain-of-custody documentation.
☐	☐	Verify that data calculation and handling activities conform to QAPP (and FSP, if used) requirements. Examples include correct use of mathematical formulas and numerical methods, correct use of programs and programing, and correct application of database information transfers.
☐	☐	Verify that any remaining or unique project QAPP (and FSP, if used) or procedural requirements have been met, and if not, determine the extent to which these requirements failed to be achieved.
☐	☐	Determine and document any limitations on the use of the project data.
☐	☐	Ensure that all deficiencies and/or conditions adverse to quality determined during the project data *verification* process have been communicated to project management and are listed on this checklist or attached for inclusion in the TRIM record system.
☐	☐	Verify that a copy of this data verification checklist has been provided to the project manager for deficiency resolution and placed in the project TRIM file system. Note that additional data verification actions may be required based on the checklist findings, such as a corrective action plan/reports, etc. The project QAO shall consult the DEQ QMP and proceed accordingly.

Please list any additional comments below. Attach additional sheets as necessary.

DEQ QAPP/FSP Checklist—Data Validation

The individual assigned in the project QAPP/FSP to perform project **data validation** *shall complete and file this checklist in the appropriate project TRIM system files.* Project personnel are encouraged to expand this standard list as project conditions warrant.

Printed Name of Staff Performing Data Validation	Date Completed
Project QAPP/FSP Title	QAPP/FSP TRIM Record #

Check the following review boxes following completion of each listed task.

Check *yes* if the task was completed without any noted discrepancies. Otherwise, check *no* and include a description of the discrepancy in the space provided. Use additional sheets as necessary.

Yes	No	
☐	☐	Verify that the approved current project QAPP, including a copy of the signed approval signature page, is currently filed in the TRIM system. Also, verify the project information has been entered into the QAO project tracker found at TRIM record #2012AEB8. If the QAPP is not filed in TRIM, or the QAO tracker is not current, immediately inform the DEQ QA manager.
☐	☐	If the project utilizes a FSP, verify that the approved project FSP, including a copy of the signed approval signature page, is currently filed in the TRIM system. Also, verify the project information has been entered into the QAO project tracker found at TRIM record #2012AEB8. If the FSP is not filed in TRIM, or the QAO tracker is not current, immediately inform the DEQ QA manager.
☐	☐	Examine and review the project QAPP (and FSP, if used) to determine if additional project-specific data *validation* requirements apply. Update this checklist to include all such items.
☐	☐	Evaluate and examine all (100%) of obtained field QC sample results, such as duplicates and trip blanks, etc., followed by assignment (if necessary) of appropriate data qualifiers to these data based on project criteria.
☐	☐	Review project analytical laboratory reports and data, including the assigned data qualifiers, to evaluate the data quality with respect to the project DQOs. Assign data qualifiers to individual data values as necessary and appropriate.

Yes	No	
☐	☐	Review the outcome of the data verification effort to evaluate the impact on data quality with respect to the DQOs.
☐	☐	Determine, when necessary and where possible, the reasons for any failure to meet methodological, procedural, or contractual requirements and evaluate the impact of such failure on the overall data.
☐	☐	Compare the project DQOs, as defined in the project QAPP (and FSP, if used), to the data obtained by the project to assess the adequacy of the data (new or existing) in relation to their intended use.
☐	☐	Determine the extent to which any nondirect measurement data (existing data), and the accompanying supporting information and documentation, meet the requirements of the data user. Specifically, does the quality of the existing data adequately support the needs of the project and support the intended use of the data for the project?
☐	☐	Determine and document any limitations on the use of the project data.
☐	☐	Determine the adequacy of the data to proceed on to the data assessment and reconciliation with user requirements phase.
☐	☐	Ensure that all deficiencies and/or conditions adverse to quality determined during the project data *validation* process have been communicated to project management and are listed on this checklist or attached for inclusion in the TRIM record system.
☐	☐	Verify that a copy of this data validation checklist has been provided to the project manager for deficiency resolution and placed in the project TRIM file system. Note that additional data validation actions may be required based on the checklist findings, such as a corrective action plan/reports, etc. The project QAO shall consult the DEQ QMP and proceed accordingly.

Please list any additional comments below. Attach additional sheets as necessary.

DEQ QAPP/FSP Checklist—Annual QAO Project Audit

The individual assigned in the project QAPP/FSP as the project quality assurance officer (QAO) shall audit the project on at least an annual basis. The QAO *shall complete this checklist as part of the audit process and file the completed form in the appropriate project TRIM system files.* Project QAOs are encouraged to expand this standard list as project conditions warrant.

Printed Name of Staff Performing the QAO Audit	Date Completed
Project QAPP/FSP Title	QAPP/FSP TRIM Record #

Check the following review boxes following completion of each listed task.

Check *yes* if the task was completed without any noted discrepancies. Otherwise, check *no* and include a description of the discrepancy in the space provided. Use additional sheets as necessary.

Yes	No	
☐	☐	Verity that the approved current project QAPP (and FSP, if used), including a copy of the signed approval signature page, is currently filed in the TRIM system. Also, verify the project information for the QAPP (and FSP, if used) has been entered into the QAO project tracker found at TRIM record #2012AEB8. If the QAPP (and FSP, if used) are not filed in TRIM, or the QAO tracker is not current, immediately inform the DEQ QA manager.
☐	☐	Verify that the approved and current project documents, such as the project QAPP (and FSP, if used), SOPs, etc., are available to project staff and are in use per project requirements.
☐	☐	Determine through review and observation if the project has performed and documented project activities as described and required by the project QAPP (and FSP, if used) such that the needs of the data user are satisfied.
☐	☐	Determine if the project QAPP (and FSP, if used) adequately document and describe the actual project requirements such that the needs of the data user are satisfied. If necessary, in coordination with the project manager, initiate project document revision, review, and approval efforts in accordance with the DEQ QMP.
☐	☐	Determine if the project analytical requirements are adequately met by the selected laboratory, including use of proper analytical methods and sufficient analytical data support documentation.

Yes	No	
☐	☐	Determine if project sample handling activities are in compliance with the requirements of the project QAPP (and FSP, if used).
☐	☐	Determine if project field activities are in compliance with the requirements of the project QAPP (and FSP, if used).
☐	☐	Determine if all nondirect data acquisition associated with the project has been addressed and properly documented in the project QAPP (and FSP, if used).
☐	☐	Compare actual project documents available in the DEQ TRIM record system against the document filing requirements contained in the project QAPP (and FSP, if used). Identify existing deficiencies in the project TRIM system files, such as missing field note pages and missing chain-of-custody forms, and provide this information to the project manager for immediate resolution.
☐	☐	Ensure that all deficiencies and/or conditions adverse to quality determined during the project QAO audit process are listed on this checklist or attached for inclusion in the TRIM record system.
☐	☐	Verify that a copy of this annual QAO audit report has been provided to the project manager for deficiency resolution and placed in the project TRIM file system. Note that additional audit administrative actions may be required based on audit findings, such as a corrective action plan/reports, etc. The project QAO shall consult the DEQ QMP and proceed accordingly.

Please list any additional comments below. Attach additional sheets as necessary.

Appendix D. Procedures

The following Procedures are included in this appendix:

- University of Idaho College of Agriculture Soil Sampling - Bulletin 704

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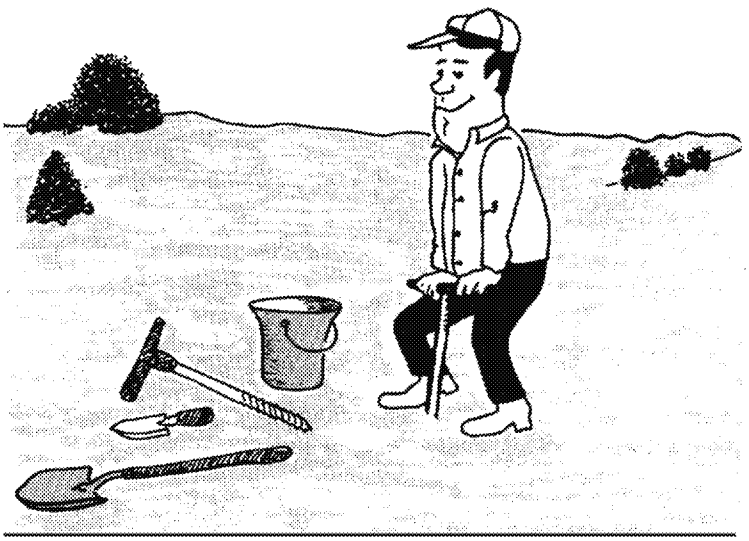
Soil Sampling

Bulletin 704
(revised)

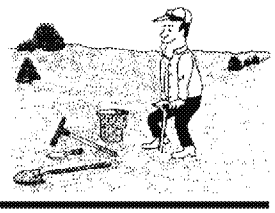
R. L. Mahler and
T.A. Tindall



College of Agriculture

University of Idaho
Cooperative Extension System

Soil Sampling



Environmental concerns have brought nutrient management in agriculture under increased scrutiny. A goal of sound nutrient management is to maximize the proportion of applied nutrients that is used by the crop (nutrient use efficiency). Soil sampling is a best management practice (BMP) for fertilizer management that will help improve nutrient use efficiency and protect the environment.

Soil sampling is also one of the most important steps in a sound crop fertilization program. Poor soil sampling procedures account for more than 90 percent of all errors in fertilizer recommendations based on soil tests. Soil test results are only as good as the soil sample. Once you take a good sample, you must also handle it properly for it to remain a good sample.

A good soil testing program can be divided into four operations: (1) taking the sample, (2) analyzing the sample, (3) interpreting the sample analyses, and (4) making the fertilizer recommendations. This publication focuses on the first step, collecting the soil sample.

Once you take a sample, you must send it to a laboratory for analysis. Then the Extension agricultural educator or fertilizer fieldman in your county can interpret the analysis and make specific fertilizer recommendations. Fertilizer guides from the University of Idaho Cooperative Extension System are also available to help you select the correct fertilizer application rate.

The soil sampling guidelines in this publication meet sampling standards suggested by federal, state, and local nutrient management programs in Idaho.

What is a soil test?

A soil test is a chemical evaluation of the nutrient-supplying capability of a soil at the time of sampling. Not all soil-testing methods are alike nor are all fertilizer recommendations based on those soil tests equally reliable.

Reliable fertilizer recommendations are developed through research by calibrating laboratory soil test values and correlating them with crop responses to fertilizer rates. These soil test correlation trials must be conducted for several years on a particular crop growing on a specific soil type. If soil test calibration is incomplete, fertilizer recommendations based on soil-test results still can only be best guesses.

A soil test does not measure the total amount of a specific nutrient in the soil. There is usually little relationship between the total amount of a nutrient in the soil and the amount of a nutrient that plants can obtain.

A soil test also does not measure the amount of plant-available nutrients in the soil because not all the nutrients in the soil are in a form readily usable by plants. Through research, however, a relationship can usually be established between soil test nutrient levels and the total amount of a nutrient in the soil.

What does a soil test measure?

Present soil-testing methods measure a certain portion of the total nutrient content of the soil. During testing, this portion is removed from the soil by an extracting solution that is mixed with the soil for a given length of time. The solution containing the extracted portion of the nutrient is separated from the soil by filtration, and then the solution is analyzed.

A low soil-test value for a particular nutrient means the crop will be unable to obtain enough of that nutrient from the soil to produce the highest yield under average soil and climatic conditions. A nutrient deficiency should be corrected by adding the nutrient as a fertilizer. The amount of nutrient that needs to be added for a given soil-test value is calculated based on results from the correlation research test plots.

Sampling timing

Because nutrient concentrations in the soil vary with the season, you should take soil samples as close as possible to planting or to the time of crop need for the nutrient. Ideally, take the soil samples 2 to 4 weeks before planting or fertilizing the crop. It usually requires 1 to 3 weeks to take a soil sample, get the sample to the testing laboratory, and obtain results.

Sampling very wet, very dry, or frozen soils will not affect soil test results

though collecting soil samples under these conditions is difficult. Do not sample snow-covered fields. The snow makes it difficult to recognize and avoid unusual areas in the field, so you may not get a representative sample.

Sampling frequency

For best soil fertility management, especially for the mobile nutrients, sample each year and fertilize for the potential yield of the intended crop. Having an analysis performed for every nutrient each year is not necessary. Whether you need an analysis of a nutrient depends on such things as its mobility in the soil and the nutrient requirements of the crop.

Take soil samples at least once during each crop rotation cycle. Maintain a record of soil test results on each field to evaluate long-term trends in nutrient levels.

Sampling procedure

One of the most important steps in a soil testing program is to collect a soil sample that represents the area to be fertilized. If the soil sample is not representative, the test results and recommendations can be misleading.

The correct steps in soil sampling are illustrated in figure 1. Before sampling, obtain necessary information, materials, and equipment from the Extension agricultural educator or fertilizer fieldman in your county.

Use proper soil sampling tools. A soil auger or probe is most convenient, but you can use a shovel or spade for shallow samples. You will need a plastic bucket or other container for each sample to help you collect and mix a composite sample.

Be sure that all equipment is clean, and especially be sure it is free of fertilizer. Even a small amount of fertilizer dust can result in a highly erroneous analysis. Do not use a galvanized bucket when analyzing for zinc (Zn) or a rusty shovel or bucket when analyzing for iron (Fe). If the sample will be analyzed for Fe or manganese (Mn), do not dry the soil sample before shipping.

When sampling, avoid unusual areas such as eroded sections, dead furrows, and fence lines. If the field to be sampled covers a large area with

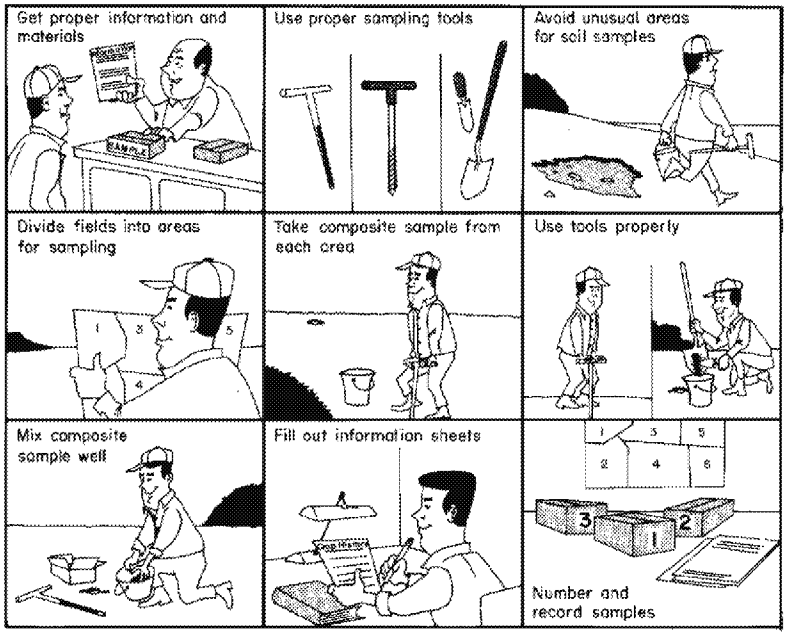


Fig. 1. Follow these steps to obtain a good sample for testing (redrawn courtesy of the National Fertilizer Institute).

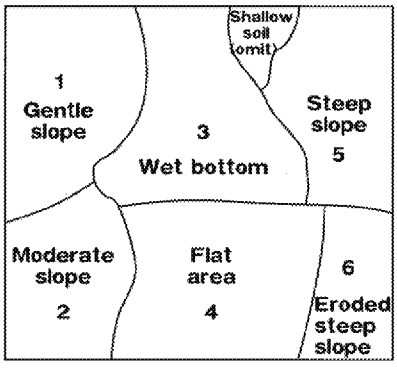


Fig. 2. A field with areas identified as sampling units.

varied topography, subdivide it into relatively uniform sampling units (fig. 2). Sampling subdivision units that are too small to fertilize separately may be of interest, but impractical if you do not treat the small units differently from the rest of the field. Omit these areas from the sampling.

Within each sampling unit take soil samples from several different locations and mix these subsamples into one composite sample. The number of subsamples needed to obtain a representative composite sample depends on the uniformity and size of the sampling unit (table 1). Although the numbers of subsamples in table 1 give the best results, they may be unrealistic if you plan to take a great number of samples. An absolute minimum of 10 subsamples from each sampling unit is necessary to obtain an acceptable sample. The more subsamples you take, the better the representation of the area sampled.

Take all subsamples randomly from the sampling unit, but be sure to distribute subsample sites throughout the sampling unit. Meander or zig-zag throughout each sampling unit to sample the area. Special considerations are necessary in eroded areas, furrow irrigation, under no-till, and where fertilizer is banded (see "Special Sampling").

The total amount of soil you collect from the sampling unit may be more than you need for analyses. Mix the individual subsamples together thoroughly and take the soil sample from the composite mixture. The composite sample should be at least 1 pint—about 1 pound—in size.

Table 1. Number of subsamples recommended for a representative composite sample based on field size.

Field size (acres)	Number of subsamples
fewer than 5	15
5 to 10	18
10 to 25	20
25 to 50	25
more than 50	30

Table 2. Effective rooting depth for some common Idaho crops.

Crop	Depth (feet)
Cereals (wheat, barley, oats)	5 to 6
Corn	5 to 6
Alfalfa, rapeseed	4 to 5
Hops, grapes, tree fruits	4 to 5
Sugarbeets	2 to 3
Peas, beans, lentils, onions, potatoes, mint	2
Vegetable seed	1 to 1½

Sampling depth

Depth of sampling is critical because tillage and nutrient mobility in the soil can greatly influence nutrient levels in different soil zones (fig. 3). Sampling depth depends on the crop, cultural practices, tillage depth, and the nutrients to be analyzed.

Because the greatest abundance of plant roots, greatest biological activity,

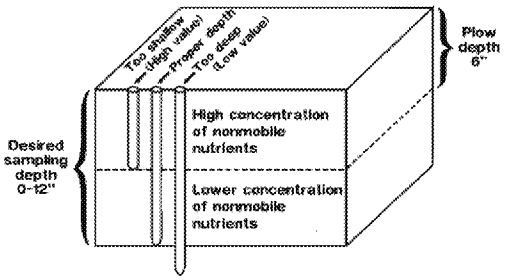


Fig. 3. Too deep or shallow a sampling depth can produce inaccurate soil test results. The plow layer is usually higher in nonmobile nutrients than the soil layers below it.

and highest nutrient levels occur in the surface layers, the upper 12 inches of soil are used for most analyses. The analyses run on the surface sample include soil reaction (pH), phosphorus (P), potassium (K), organic matter, sulfur (S), boron (B), zinc (Zn), and other micronutrients.

Sampling depth is especially critical for nonmobile nutrients such as P and K. The recommended sampling depth for nonmobile nutrients is 12 inches (fig. 3).

The tillage zone, typically 6 to 8 inches deep, usually contains a relatively uniform, high concentration of nonmobile nutrients. Below the tillage zone the concentration is usually lower. Therefore, a sample from the tillage zone will usually have a higher content of nonmobile nutrients than a sample from the desired 6- to 12-inch sample depth. This can lead to erroneous results.

Depth sampling

When sampling for mobile nutrients such as nitrogen (N), boron (B), and sulfur (S), take samples by 1-foot increments to the effective rooting depth of the crop (fig. 4). This can be a depth of 5 to 6 feet (table 2) unless the soil has a root-limiting layer such as bedrock or hardpan. For each foot depth, take 10 or more subsamples at random from the sampling unit.

If you plan to sample less than a year after banding or injecting fertilizer or if you have any question about fertilizer placement, use the sampling technique described under "Areas Where Fertilizer Has Been Banded." Irrigation or precipitation should disperse mobile nutrients over a period of a year.

Sample handling

Soil samples need special handling to ensure accurate results and minimize changes in nutrient levels because of biological activity. Keep moist soil samples cool at all times during and after sampling. Samples can be frozen or refrigerated for extended periods of time without adverse effects.

If the samples cannot be refrigerated or frozen soon after collection, air dry them or take them directly to the soil testing laboratory. Air dry by spreading the sample in a thin layer on a plastic sheet. Break up all clods or lumps, and spread the soil in a layer about 1/4 inch deep. Dry at room temperature. If a circulating fan is available, position it to move the air over the sample for rapid drying.

Caution: Do not dry where agricultural chemical or fertilizer fumes or dust will come in contact with the samples. Do not use artificial heat in drying. Ask the Extension agricultural educator or fertilizer fieldman in your county for more details concerning special handling of soil samples.

When the soil samples are dry, mix the soil thoroughly, crushing any coarse lumps. Take from the sample about 1 pint (roughly 1 pound) of well-mixed soil and place it in a soil sample bag or other container. Soil sample bags and soil test report forms are available from the Cooperative Extension System office in your county or from a fertilizer fieldman.

Label the bag carefully with your name, the sample number, sample depth, and field number. The field number should correspond with a field or farm map showing the areas

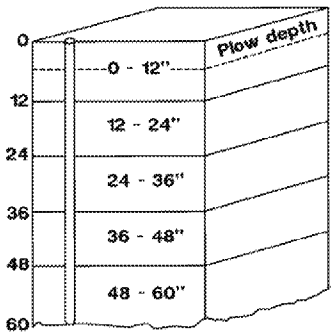


Fig. 4. Depth sampling (successive samples by 12-inch increments) for mobile nutrients (especially N) should be continued to rooting depth, which may be 5 to 6 feet for some crops.

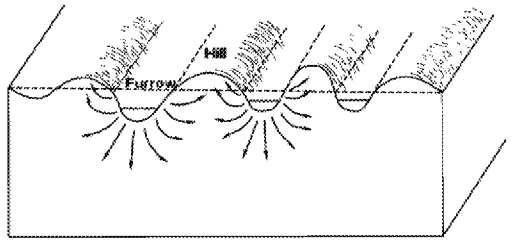


Fig. 5. Movement of mobile nutrients in furrow-irrigated fields.

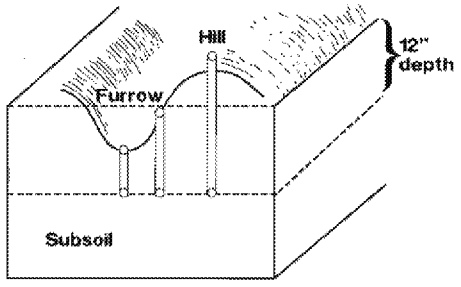


Fig. 6. Special sampling techniques are required when soil sampling furrow-irrigated fields. Take a sample from the hilltop, the furrow bottom, and at the midpoint between the hilltop and furrow bottom. The 12-inch sampling depth is based on the midpoint sampling location.

sampled. This will help you keep an accurate record of soil test reports. Provide information on crop to be grown, yield potential, recent history of crops grown, yields, fertilizer applied, and other information.

Sample analysis

Analyze regularly only for those nutrients that have been shown to be yield limiting in your area or for the crop to be grown. In general, all soils should be analyzed for N, P, K, and S. For determination of potential need for micronutrients, refer to PNW 276, *Current Nutrient Status of Soils in Idaho, Oregon, and Washington*. Occasional analyses for micronutrient concentrations may be advisable.

Special sampling

Special sampling problems occur in fields that have been leveled for irrigation, fields that have lost all or most topsoil as a result of erosion, fields that are surface (furrow) irrigated, fields that have had a fertilizer band applied, and fields that are not thoroughly tilled.

Land-leveled and eroded areas

Areas that have been eroded or artificially leveled for irrigation usually have little or no original topsoil. The soil surface may be exposed subsoil material. These areas should be sampled separately if they are large enough to be managed differently from where topsoil has not been removed. Subsoil material is usually low in organic matter and can be high in clay, calcium carbonate (lime), or both.

Furrow-irrigated fields

For a representative soil sample, sample furrow-irrigated fields before the furrowing operation. If furrowing has already been completed, follow the special sampling procedures described here.

The movement of water and dissolved plant nutrients can create unique nutrient distribution patterns in the hills between the furrows (fig. 5). To obtain a representative sample, you need to be aware of furrow direction, spacing, and location, and to take closely spaced soil samples perpendicular to the furrow (fig. 6).

Approximately 20 sites (with at least three samples per site) are needed for a representative composite soil sample. At each sampling site, take a sample from the hilltop, from the midpoint between the hilltop and furrow, and from the furrow bottom. The sampling depth at the midpoint between the hilltop and furrow bottom should be 12 inches. The bottom point of this sample should be the same as for the furrow and hilltop samples. Thus, the furrow sampling depth will be less than 12 inches, while the hilltop sampling depth will be more than 12 inches (fig. 6).

Mix the hilltop, midpoint, and furrow samples to make a composite sample for each site. Mix the site samples for a representative composite field soil

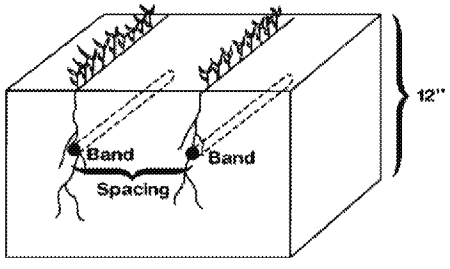


Fig. 7. Diagram of fertilizer location in soil where fertilizer has been banded.

sample to be analyzed for nonmobile nutrients (P, K, and micronutrients). Deeper profile sampling (depth sampling) is recommended for mobile nutrients (N and S).

Areas where fertilizer has been banded

Banding of fertilizers is becoming a more common practice (fig. 7). In fields where fertilizers have been banded and tillage has occurred before soil sampling, regular sampling procedures can be followed. However, if tillage has not adequately mixed the soil, special soil sampling is required. If a field has had a banded fertilizer application the previous growing season and has not been plowed, an ideal sample would be a continuous slice 1 to 2 inches thick and 12 inches deep extending from the center of one band to the center of the next band.

Little research has been conducted to determine the best method of sampling banded fields. Currently three different approaches are used widely. Each method produces a satisfactory representative sample, but the effort required to obtain these samples differs considerably.

Systematic sampling method. If you know the direction, depth, and spacing of the fertilizer band, you can obtain a representative soil sample with this sampling procedure. Take 5 to 10 soil samples perpendicular to the band row beginning on the edge of a fertilizer band and ending at the edge of an adjacent band (fig. 8). Follow this procedure on at least 20 sampling sites in each field or portion of a field being sampled. Mix and composite the soils collected from each site to obtain a representative soil sample.

Controlled sampling method. You also should know the direction, depth, and spacing of the fertilizer bands to obtain a representative soil sample with this method. Take 20 to 30 soil cores from locations scattered throughout the field or portion of the field. Avoid sampling directly in a fertilizer band.

The composite sample should adequately represent the area being sampled. This method may result in slightly lower soil test values of nonmobile nutrients (P, K, and micronutrients) than the systematic and random sampling methods.

Random sampling method. Use this sampling method when the location of the previous season's fertilizer bands is not known. Take 40 to 60 random soil cores to form a composite sample of the area being sampled.

Reduced tillage or no-till fields

You may need special approaches to soil sampling with reduced tillage or no-till fields because the soil has been disturbed so little that fertilizer, whether broadcast on the surface or banded below the surface, is not mixed into the soil. You need to know the history of fertilization, tillage, and other management practices to determine how to obtain a representative sample.

If nonmobile nutrients (P, K, and micronutrients other than B) have been surface broadcast and little or no tillage has been used since their application, remove the surface 1 inch of soil before sampling. Nutrients in the top inch of soil will probably not be available to the growing crop.

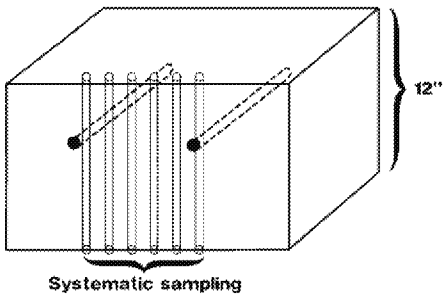


Fig. 8. Systematic soil sampling in a field where fertilizer has been banded (sampling method 1).

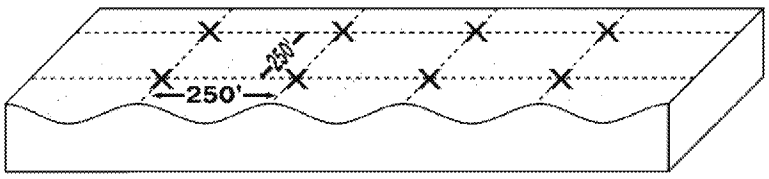


Fig. 9. Grid soil sampling pattern where samples are collected every 250 feet. Note that a complete soil sample is collected at each spot marked with an X.

If fertilizer has been banded with the no-till system, consider methods suggested in "Areas Where Fertilizer Has Been Banded." If a field has been under a continuous no-till system for a long time, determine the pH of the surface foot at 3-inch intervals (0 to 3, 3 to 6, 6 to 9, 9 to 12 inches) every 3 to 5 years. Soil pH will affect the availability of fertilizer nutrients as well as the activity of commonly used herbicides, insecticides, and fungicides.

Grid sampling in nonuniform fields

Many fields are not uniform and vary both horizontally and vertically across landscapes. Traditional soil sampling procedures average nutrient levels in soil subsamples to determine average nutrient levels in the field. The nutrient values obtained are good, but the manager must realize that many of the values in the field are either less than or greater than the values determined. When fields are broken into grids with shorter distances between the sampling points a more precise soil map can be developed to determine nutrient needs.

The technology is now available to combine grid sampling with variable rate fertilizer application to handle spatial variability within a field. These application techniques make fertilizer nutrient application more precise, resulting in greater nutrient use efficiency and reducing pollution potential.

Irrigated fields including individual pivots should be set up in a 200- to 300-foot grid for potato, sugarbeets, corn, and other potentially high-N-use crops (fig. 9). A wider grid of 400 feet may be used for small grains, beans, and other crops where N management is less intensive or under dryland conditions.

Soil nutrient needs for each segment of the grid are entered into a computer-driven system mounted on specialized commercial fertilizer application equipment. Variable rates of nutrients are then applied based on individual soil samples over the entire field.

A similar system designed for fertilizer applications through pivot sprinklers is being developed by the University of Idaho. This system has the potential to apply variable rates of nutrients and water specifically related to changes across individual fields.

The Soil Conservation Service has a digitized soil survey information system (SSIS), which when combined with the results of grid sampling provides specific information and recommendations for soils and soil types within a field. The SSIS can locate pockets of sandy or coarse-textured soils where leaching is a major concern or areas of finer-textured soils where pockets of residual N may occur. The SSIS also indicates where erosion or surface runoff may be high and where areas should be targeted for federal programs such as the Conservation Reserve Program.

Another computer-mapping technique, Geographic Information Systems (GIS), can be combined with the results of grid sampling to provide growers and land managers with information for land-use planning.

Additional information on proper soil sampling procedures can be obtained from the Extension agricultural educator or fertilizer fieldman in your county.

The authors—Robert L. Mahler, soil scientist, Moscow, and Terry A. Tindall, former Extension soil scientist, Twin Falls Research and Extension Center; both with the University of Idaho Department of Plant, Soil, and Entomological Sciences.

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, LeRoy D. Luft, Director of Cooperative Extension System, University of Idaho, Moscow, Idaho 83843. The University of Idaho provides equal opportunity in education and employment on the basis of race, color, religion, national origin, age, gender, disability, or status as a Vietnam-era veteran, as required by state and federal laws.

5,750 1990-94, 1,500 8-97 (reprint) $2.00

Appendix E. Idaho Soil and Water Conservation Commission Records Management and Retention Manual

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Idaho Soil & Water Conservation Commission

Records Management and Retention Manual

Idaho Soil and Water Conservation Commission
Records Retention Manual

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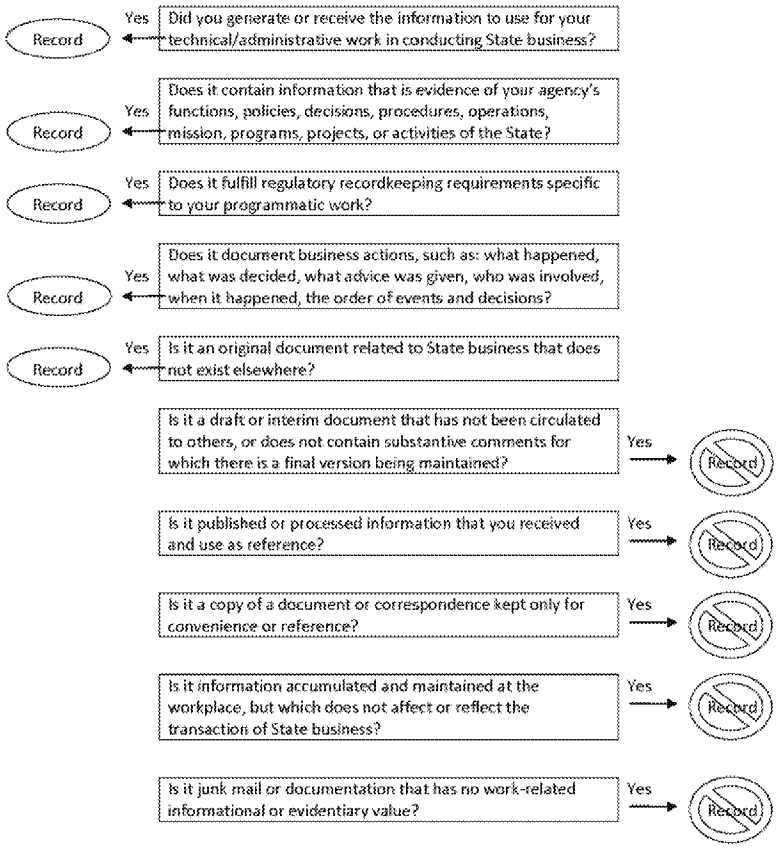
Idaho Soil and Water Conservation Commission
Records Retention Manual

Is It A Record?

Not all information that the Commission receives, stores or shares is considered a "record". The following will help, but remember –

1. ***If an item fits a Series Description in the SWCC Records Retention Schedule,*** *it is a record.*
2. ***When in doubt,*** *treat an item as a record.*



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Record Lifecycle

Records Management is the management of records of the Commission throughout their life cycle -

1. Identification
   a. Is it a record? Not all pieces of paper or electronic data are considered records
2. Classification within the State Record Retention Schedule
   a. The type of record decides its eventual fate (storage, destruction)
   b. Record hierarchy. The agency listed on the retention schedule as the office record is responsible for retention.
3. Temporary Storage
   a. Records may be stored in-house, either in physical or electronic form
   b. Records may be housed at the ISHS Records Center. We can retrieve these as needed
4. Security
   a. Some records, such as loan documents, need secure storage
   b. Others, such as batch transmittals, can be stored in a non-secure location
5. Retrieval and Tracking
   a. Location and availability of records
   b. Movement of records between locations (local and state)
6. Permanent Storage or Destruction
   a. Permanent records may be stored at the ISHS Archive. These are records that have enduring value to the State of Idaho.
   b. Documents that are not permanent can be permanently stored in-house or at the Records Center, and recycled or securely shredded at end of life.
   c. Electronic documents should be stored in a format that is retrievable in the future. For example, files stored on 5 ¼ inch floppy disks may no longer be retrievable.

Records Retention Schedule

Retention schedules are living documents and may change due to technological advancements or other factors. **They should be reviewed and modified periodically.**

The Idaho Soil and Water Conservation Commission records retention schedules provide approved and documented policies for retaining important records and disposing of obsolete records. The schedules apply to all records regardless of the media (paper, electronic, etc) on which they reside. The schedules apply to the official set of records as defined by each section for retention purposes, and follow the State of Idaho Records Retention Schedules, providing a level of uniformity in records retention between the Commission and other Idaho state government agencies.

Copies or duplicates of any of the identified records may be destroyed at any time after the use for which they were created ends. However, in no event should duplicates be retained longer than the official records. If additional and significant information is added to a duplicate then it should be reassessed for retention.

Non-records (cover letters, thank-you notes, reference materials, etc.) may be disposed of at any time.

Approved schedules do not preempt good judgment.
Documents, regardless of format or storage media (e.g., electronic files), associated with any dispute, audit or legal proceeding should not be destroyed or altered without consultation with the Commission records manager, General Counsel, Deputy Attorney General or the State Archivist.

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Inventory

A records inventory is compiling a descriptive list of each record series or system, including the location of the records and any other pertinent data, *not* a list of each document or each folder. The goal of a records inventory is to gather information for scheduling purposes.

Commission records are inventoried at the "series" level, following the State of Idaho Records Retention schedules. The accompanying SWCC Records Inventory Form can be used. For records that cannot be matched to a Series, the State Archivist can be contacted for guidance. Non-records (duplicates, etc) are not included in the inventory.

Hierarchy

Commission records should not be destroyed or substantially relocated without the authorization of the responsible section/employee. For example -

- Vehicle records are under the authorization of the fleet manager
- Loan documents are under the authorization of the loan officer or loan assistant
- Financial documents are under the authorization of the financial officer
- CREP records are under the authorization of the CREP coordinator

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Personally Identifying Information (PII)

To ensure that the Commission maintains the trust of the public, safeguarding Personally Identifying Information that is in the possession of the Commission, and preventing its compromise, unauthorized disclosure, unauthorized access or potential access is essential.

Personally Identifiable Information (PII) is any information about an individual that can be used to distinguish or trace an individual's identity. Because of the nature of the data, Idaho and Federal requirements, and Commission interaction with outside agencies, a definition is required for Personal Identifying Information (PII) within our systems.

The following information in any form is considered to be PII:

Personal Information -

- Full name in conjunction with maiden name, mother's maiden name, or alias
- Personal identification number, such as social security number (SSN), passport number, driver's license number, taxpayer identification number
- Personal characteristics, including photographic image or fingerprints
- E-mail address in conjunction with full residential address or mailing address and telephone number

Financial Information -

- Financial account or credit card/debit card numbers of any kind
- User identification codes or passwords
- Credit reports, loan documents

Farm Bill Information -

Farm Bill section 1619 information may include, but is not limited to the following data contained in the Privacy Act System of Records FSA-a, Farm Records (Automated):

- State identification and county number (where reported and where located);
- Producer/landowner and business entity name, full address, phone number, and identification type;
- Farm, tract, field, and contract numbers;
- Production shares and share of acres for each Farm Serial Number (FSN) field;
- Acreage information including crop code;
- Practice code;
- Aerial photographs;
- Attributes for Common Land Units (CLUs) in USDA's Geospatial Information System;
- Producer Social Security Numbers (SSNs) and tax identification numbers.

Records containing PII must be **securely** stored, transmitted and disposed
Access/use must be **restricted** to specific employees

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SWCC File Name Formatting

File-naming conventions should be:

1. Intuitive (avoid slang, codes or cryptic phrases)
2. Easily sortable (lead with dates or names, etc.)
3. Provide proper information (when, what, who)
4. Flexible (it may be desirable to store records by fiscal year or by calendar year, but they should not mix [e.g., ALL invoices are FY, ALL loans are by CY, etc.])
5. Avoid conflicts (several files in different locations with the same name, or files with characters or spaces that are not supported by certain applications etc.)
   - Underscores_are_preferred
   - CamelCaseIsPreferred
   - Spaces are undesirable
6. Formatting of common name types -
   - Date
     - Should consistently use the TYPE of date (date of service, date of invoice etc)
     - STYLE of date could easily vary and still provide easy sorting, for example –
     - yyyy_mm_dd
     - yyyy_mm
   - Item
     - Short and Descriptive
     - If duplicates could exist, then an additional descriptor should also be used
   - Descriptor/additional info
     - Prevents duplicate names
     - If folders are combined during archiving, etc, duplicate names could cause the accidental deletion of a file

Examples –

Date_Item_Descriptor (invoicing folder)
12_2014_Newsletter_Stuebner
2_2015_SpecialEvent_Stuebner

Date_Item (management board folder)
2009_09_23_AgendaAndHandouts
1995_09_13_DraftMinutes
1996_01_17_ApprovedMinutes

Item_Descriptor_Date (CREP folder)
county#_tract#_ConservationPlan
county#_tract#_SeedingPlan
county#_Tract#_CPA13_year
county#_Tract#_848_year
county#_Tract#_Photos_year
county#_Tract#_FieldNotes_year

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Establishing and Maintaining the SWCC Retention Schedule

1. Identify Commission records
   - The SWCC Records Inventory Form can be used
   - Identify documents that are not records and determine their lifecycle if needed
   - The task should be completed using minimal field staff time, since this is not included in their current scope of work
2. Assign records to a Series
   - Once in a series, standard State retention and transfer guidelines apply
   - Determine if Commission requirements exceed the State requirements and adjust the guidelines accordingly
3. Identify records that can be stored or destroyed. Some examples include -
   - Scan and shred inactive CREP contracts
   - Move inactive loan records from the State Archives to the State Records Center. Note that this will be a large task because it will require identifying contents and re-labeling boxes. It cannot be done until the ISHS new computer system is in place. With minimal training by the loan assistant, it could be done by other office staff.
4. Identify records suitable for the adoption of a standard file name formatting system or that can be relocated to enhance the current workflow
   - **Active Records/Folders**
     i. The specifics of a naming system for a folder should be agreed to by the **primary users** (responsible section/employee) of the records.
     ii. Formatting system should be flexible, based on the needs of the primary users
     iii. Within the formatting system, there should be consistency for ease of use
   - **Inactive Records/Folders**
     i. Given the large volume of files (over 150,000), it is not practical to reformat or catalogue most old records/folders
        - Return on investment is quite low
        - Good results can be obtained using finding aids such as key word searches
     ii. For frequently used folders, pick a start date and move forward with new name formatting or reorganization at that time
     iii. Smaller folders can be renamed in a relatively short period of time. For example, the Management Board folder was de-duplicated and reduced from approximately 7,000 files to 600 files, combining and renaming files, with no loss of original data.
     iv. Old formats will cause problems if the Commission moves to a web-based application that does not support spaces, or if employees are trying to find a record without adequate finding aids.

For records stored at the Records Center, the SWCC Records Manager will –

- Complete a State Records Center Disposal Authorization Form
- Receive approval of the administrator
- Send the original Authorization Form to the Records Center
- Keep and file a copy of the form
- The records are disposed by the State Records Center

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Employee Instructions for Records Disposal

1. **Identify** if the item is actually a record (see page 4)
   a. Record? *Move to step 2*
   b. Not a record? *Toss or shred*
   c. Not sure? *Check the Retention Schedule or call the SWCC Records Manager (RM)*
   d. Of potential historical value? *Contact the RM*

2. **Classify** the record
   a. Locate the record type on the SWCC Records Retention Schedule
   b. Who is the Office of Record?
      i. Not SWCC (item is a version of an official record held by another agency)? *Toss or shred*
      ii. SWCC (or you are not sure)? *Select A, B or C below.*

3. **Work with RM** to do one of the following –

   A. **Store** the record - the record is no longer needed by the office, but has not reached the end of the retention period.
      i. Paper records are sent to the Idaho State Records Center
      ii. Electronic records are stored on the V drive

   B. **Archive** the record - The record is no longer needed by the office, and is a permanent record.
      i. Paper records are sent to the Idaho State Archives
      ii. Electronic records are stored on the V drive

   C. **Destroy** the record - the record is no longer needed by the office, and has reached the end of the retention period.
      i. Complete an SWCC Record Disposal Form and forward to the RM
      ii. After approval, destroy (shred or toss, depending on level of PII) or delete the record

SWCC Records Manager (RM) duties –

- Retain all records in the manner prescribed by the Idaho State Records Retention Schedule.
- Assist employees in determining if an item is a record, the type of record, and the record's ultimate fate.

- For records that are to be stored –
  - Maintain secure electronic archives on the State of Idaho/Admin database, located at
  - Assign the appropriate storage location for paper records (HQ office or Records Center)
  - Assist in getting the records to the appropriate location
  - Log records into system and assign box numbers or file locations

- For records that are to be destroyed –
  - Collect the SWCC Disposal Form from the responsible employee
  - Approve destruction and file the SWCC Disposal Form
  - Complete the Records Disposal Log
    - The Records Disposal Log is a PERMANENT RECORD (SG0035). Do not remove or delete the log. A backup copy is kept (see next page) in case of accidental deletion.
  - Securely dispose of any records transported/electronically transferred to the HQ office

- For records where it has not been determined if they are duplicates or non-records –
  - Store in a temporary archive until such a determination can be made.

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Retaining and Updating the Records Management Manual

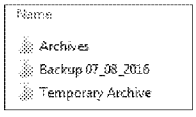
Category	Series	Series Title (as of April 2016)	Retention Period
Administrative	SG0036	RECORDS MANAGEMENT FILES Records used in creating and establishing records management programs. They may contain records inventories, correspondence, classification designations, records control, equipment, filing procedures/manuals, training information, and other documents created by the State Archives and other agencies to facilitate records management practices. May also contain information on records management equipment and/or computer software.	Permanent

This manual and all documents and correspondence related to its establishment are permanent records. All previous versions must also be retained.

Because the V drive is easily accessed by all employees, the final PDF version is located at – V:\7101 General\Admin\Records Management

All working versions and related documents are located at - P:\Records Management

As of July 8, 2016, this includes –



To ensure the manual's integrity and version control, the following steps should be taken –

1. Due to the inherently changeable nature of Word and Excel documents, there is a Backup folder at P:\Records Management. All documents and spreadsheets must be backed up to this folder when changed.
2. Each final version of the Records Management Manual should be dated, converted to a PDF document and made available to employees as a record management tool in the Records Management folder on the v drive. Reference materials A1 through A7 can also be included here.